

2ND MONITORING REPORT

BRAZILIAN AMAZON APD GROUPED PROJECT

ID 2551



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History of CCB Status	Validation statement issued on 25 August 2022. 1st Verification statement issued on 25th August 2022.
Gold Level Criteria	Exceptional Biodiversity Benefits – Sustained by meeting the vulnerability criteria established in the CCB standard. One Critically Endangered (CR) species (<i>Psophia obscura</i>) and three Endangered (EN) species (<i>Ateles chamek</i> , <i>Inia geoffrensis</i> and <i>Pteronura brasiliensis</i>) are found within the project area. These species trigger the vulnerability criteria and classify the project area as a Key Biodiversity Area (KBA). The project aims the promotion of species conservation through the maintenance of forest habitats and avoidance of hunt pressure

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1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

The table presented below shows the outcomes or impacts estimated by the end of the project lifetime.

Table 1. Outcomes or impacts estimated by the end of the project lifetime.

Outcome or Impact	Achievements during the Monitoring Period	Section Reference	Achievements during the Project Lifetime
1) Digital Inclusion: In many cases, existing communities within the project area live in isolated conditions, without access to means of communication and travel days to the nearest city. This puts them in a vulnerable condition, negatively affecting their economy, health, education, well-being and even citizenship. The project will install repeating towers to provide internet and an internet access point in schools. Thus, it is expected to reduce the community's vulnerability condition, favoring their access to information, educational processes, health, economics and public services. The internet will be a fundamental part of the social engagement processes, continuous communication with communities and the feedback and grievance redress procedure. The number of towers and Internet access points provided, and the total amount of resources invested during a specific monitoring period will be reported in activity reports and monitoring reports.	4 towers (60m high) installed.	4.1.1 4.1.3	12 towers (60m high) installed. 1 tower (72m high) installed. 36 solar panels deployed. 36 battery bank deployed. 70 km of optic fiber installed.

Outcome or Impact	Achievements during the Monitoring Period	Section Reference	Achievements during the Project Lifetime
2) Wildfire GHG Emission Reduction: fire is traditionally used in the Amazon as an instrument for suppressing regenerating vegetation or clearing lands of forests for pastures and agriculture. Climatic anomalies such as El Nino alter the air currents in Brazilian Northern region, making the forest drier and more flammable. In these years, the risk of burning developing into wildfires increases and must be mitigated. In Brazil, in drier years, GHG emissions caused by forest fires can exceed 1 GtCO₂e (Aragão et al., 2018), which is equivalent to half of the national emission profile, considering all sectors of our economy. The project will provide training in good fire management and firefighting practices to communities living within the project area to prevent the spread of wildfires. Training in good management practices will be carried out to reduce the risk of fire spread. The training to fight wildfires will involve the formation of volunteer brigades. The execution of the training will be recorded through activity reports. The number of trainings will be reported in each monitoring report. Forest fires can also be avoided by implementing firebreaks. The number and length of implemented firebreaks will be monitored and reported in each monitoring report. Finally, the impact of wildfires can be reduced through quick responses from brigades.	Under development.	4.1.1 4.1.3	Under development

1.2 Standardized Benefit Metrics

The table presented below shows the standardized benefit metrics of the project lifetime.

Table 2. Standardized benefit metrics of the project lifetime.

Category	Metric	Achievements during the monitoring period	Section Reference	Achievements during the project lifetime
GHG emission reductions or removals	Net estimated emission reductions in the project area, measured against the without-project scenario.	2,733,520tCO ₂ e	3.2.4.1	3,631,304tCO ₂ e
Forest cover	For REDD projects: Estimated number of hectares of reduced forest loss in the project area measured against the without-project scenario	5,218.74 ha	3.2.1	7,390.74 ha
Improved land management	Number of hectares of existing production forest land in which IFM3 practices are expected to occur as a result of project activities, measured against the without-project scenario	Under development	-	Not yet estimated
	Number of hectares of non-forest land in which improved land management practices are expected to occur as a result of project activities, measured against the without-project scenario	Under development		Not yet estimated

Category	Metric	Achievements during the monitoring period	Section Reference	Achievements during the project lifetime
Training	Total number of community members who are expected to have improved skills and/or knowledge resulting from training provided as part of project activities	98	2.2.1 2.3.13 4.1.1 4.1.3	98
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	40		40
Employment	Total number of people expected to be employed in project activities,4 expressed as number of full-time employees5	04	2.2.1 2.3.14 4.1.1 4.1.3	04
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	02		02
Livelihoods	Total number of people expected to have improved livelihoods6 or income generated as a result of project activities	166	2.2.1 4.1.1 4.1.3	166
	Number of women expected to have improved livelihoods or income generated as a result of project activities	83		83
Health	Total number of people for whom health services are expected to improve as a result of	259	2.2.1 4.1.1	529

Category	Metric	Achievements during the monitoring period	Section Reference	Achievements during the project lifetime
	project activities, measured against the without-project scenario		4.1.3	
	Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	150		3004
Education	Total number of people for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	45	2.2.1 4.1.1 4.1.3	155
	Number of women and girls for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	22		78
Water	Total number of people who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	327	2.2.1 4.1.3 4.3.1	375
	Number of women who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured	183		209

Category	Metric	Achievements during the monitoring period	Section Reference	Achievements during the project lifetime
	against the without-project scenario			
Well-being	Total number of community members whose well-being ⁷ is expected to improve as a result of project activities	922	2.2.1 4.1.1	1,380
	Number of women whose well-being is expected to improve as a result of project activities	503	4.1.3	734
Biodiversity conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation, measured against the without-project scenario	5,218.74 ha	5.3.1	26,938.30 ha
	Expected number of globally Critically Endangered or Endangered species ⁹ benefiting from reduced threats as a result of project activities ¹⁰ , measured against the without-project scenario	4		-

2 GENERAL

2.1 Project Description

2.1.1 Implementation Description

The Brazilian Amazon APD Grouped Project (hereafter called GPD) contemplates forest conservation by avoiding deforestation, mitigating climate change, protecting biodiversity, and generating positive impacts on the life quality of local communities. Based on field surveys, BRC estimates the carbon stocks in different pools (above and below ground), the fauna diversity and the socioeconomic diagnosis of communities within or near the APD areas. This report seeks to verify the second monitoring period of the five initial instances (PAIs #1-5) and validate and verify the first monitoring period of four new instances (PAIs #6-9). The GPD 9 project activity instances (PAIs #1-9) implementation will result in the direct conservation of 27,626.34 hectares of forest during the project lifetime. During this monitoring period, the project achieved the avoidance of emissions of 2,733,520 tons CO₂e.

For carbon stock estimates, BRC uses field surveys and LiDAR remote sensing onboard an unoccupied aerial vehicle (UAV), which significantly increases the project's sampled area and the estimates' accuracy.

The biodiversity surveys were carried out in dry and rainy periods to better cover the spectrum of ecological niches, carrying out periodic surveys (every 2-5 years) to obtain a biodiversity representative sampling based on stabilizing the species rarefaction curve. These periodic field surveys are fundamental to ensure the project goals effectiveness and reduce internal risks to biodiversity, such as the invasion of exotic species and other ecological disturbances related with forest degradation.

Using satellite images, BRC tracks forest degradation and deforestation inside and outside project areas, including potential leakage areas. Leakage is being monitored and managed through remote sensing, in accordance with the validated monitoring plan and considering all rural properties of project partners. In this second monitored period, a total of 38 properties were monitored, resulting in the deduction of a value equivalent to 36,190 tCO₂e for activity shifting leakage. Furthermore, the project proponent estimates the emission of 99,415 t CO₂e due to market leakage, which can be attributed to the project for avoiding activities of a productive nature, reducing the supply of meat and grains, which can be stimulated elsewhere. In total, the deductions due to leakage made by the project proponent in the current monitored period amount to 135,604 t CO₂e. The non-permanence risk factors are being monitored and managed in accordance with the mitigation measures proposed in the non-permanence risk report. Internal risks related to project management were mitigated by the work experience of the technical team involved, while internal risks related to the financial viability of the project were mitigated by the financial resources available to the project proponent. External risks related to opportunity cost were mitigated by the existence of a legally binding agreement between project proponents and project partner rural property owners. Natural risks

related to forest fires were mitigated by carrying out fire brigade training with communities and encouraging alternative management practices that reduce the risks of wildfires in the project area.

Between the PAI's are differences about the presence and use of the project areas by the communities, because in some cases they are inside the project area, while others are in the region of influence of them, which means different forms of approach and activities. But, in all of them we focus is on improvement on some common issues, such as health, education, environment, production, and others that are specific to certain project areas. More than that specific actions on each PAI, the BRC structure is divided into teams on each state/region where the project is being implemented, so there are three teams responsible for the PAIs, one in Acre (PAIs #2-5), one in Amazonas/Mato Grosso (PAI #1 and PAI #6) and one in Pará (PAIs #7-9), and this form of organization assures that the work is done looking for each community in a singular way, even if they share similar challenges. This strategy makes the projects more sensible to individual issues in each community.

2.1.2 Project Category and Activity Type

The GPD is part of the Agriculture, Forestry, and Other Land Use (AFOLU) sectoral scope and consists in a Reduced Emissions from Deforestation and Degradation (REDD) project, under the category of Avoiding Planned Deforestation (APD), which use the module methodology described in the VCS VM0007. This document refers to the 2nd monitoring period of its five initial project activity instances (PAIs #1-5), as well as the validation and 1st verification of four new activity instances (PAIs #6-9).

2.1.3 Project Proponent(s)

The project's primary proponent is the **BRCarbon Serviços Ambientais LTDA** company, as shown below:

Table 3. Project proponent information.

Organization name	BRCarbon Serviços Ambientais LTDA.
Contact person	Mr. Marco Tuoto
Title	CEO
Address	Av. Cezira Giovanoni Moretti 655, sala 7, AgTech Garage, Reserva Jequitibá - Piracicaba, São Paulo
Telephone	+55 (19) 3424-3583
Email	mtuoto@brcarbon.com.br

2.1.4 Other Entities Involved in the Project

Other entities involved in the project comprehends the landowners, as shown below:

Table 4. Other entities involved in the project information.

Organization name	Yaco2 Gestão e Comércio de Carbono
Role in the project	Implementation partner and landowner of PAIs #1-5.
Contact person	Mr. Moacir Eloy Crocetta
Title	Person
Address	Av. Bezerra Sabino de Queiroz, 7471, Bairro Jardim Araucária, Vilhena – RO. CEP 76987-576
Telephone	+55 (69) 9969 1707
Email	madbatista@madbatista.com.br

Organization name	Incorporadora Manicoré LTDA
Role in the project	Implementation partner and landowner of PAI #6.
Contact person	Mr. Rogerio Oliveira
Title	Juridic person
Address	Av. Eduardo Ribeiro, 549, Bairro Centro, Cidade de Manicoré, AM, ZIP 69.280-000
Telephone	+55 (69) 9969-1707
Email	rogerio.alves@gpalves.com

Organization name	Mr. Gilson Antônio Moreira Machado
Role in the project	Implementation partner and landowner of PAIs #7-8.
Contact person	Bruno Machado
Title	Person
Address	Várzea Alegre extension line. 09. Vila Nova. Ipixuna do Pará, PA. ZIP 68.637-0000
Telephone	+55 (91) 9293-3163
Email	nelorebm@gmail.com

Organization name	Mr. Adão Ribeiro Soares
Role in the project	Implementation partner and landowner of PAI #9 .
Contact person	Adão Ribeiro Soares
Title	Person
Address	do Lago rod. Km 01. Jacundá, PA.
Telephone	+55 (94) 99182-6647
Email	adaoribeirosoares@hotmail.com

2.1.5 Project Start Date (G1.9)

The grouped project start date is August 2nd, 2021, where the signature of the conservation agreement between landowner and BRC for the five initial project activity instances (**PAIs #1-5**) occurred. In 2022 other agreements were signed between BRC and landowners for the inclusion of new project activity instances. On these agreements, 4 new private properties were included on project's scope, as presented below.

Table 5. Project start date for each PAI.

Instance	Property name	Project Start Date	Landowner	Deforestation Permit
PAI #1	Fazenda Castanhal	02 nd August 2021	Mr. Moacir Eloy Corecetta	10 th December 2018
PAI #2	Fazenda Katianã			15 th April 2021
PAI #3	Seringal Palmares			15 th July 2021
PAI #4	Seringal Porongaba			15 th July 2021
PAI #5	Seringal Potiguar			17 th July 2021
PAI #6	Fazenda Lagoa Grande II	8 th August, 2022	Incorporadora Manicoré LTDA	08 th October 2021
PAI #7	Fazenda Nubia Floresta	30 th May 2022	Mr. Gilson Antônio Moreira Machado	10 th March 2022
PAI #8	Fazenda Floresta 1			10 th March 2022
PAI #9	Fazenda Ribeiro Rondon	17 th August 2022	Mr. Adão Ribeiro Soares	18 th August 2020

These agreements are presented on Appendix I - Conservation agreements. Each landowner involved in the project' scope is considered a known deforestation agent, their deforestation intention is confirmed by the documentary history of prior deforestation permits, recent approval from relevant government department (local to national) for conversion of forest to an alternative land use, or documentation that a request for approval has been filed with the relevant government department for permission to deforest and convert to alternative land use, as aligned with the contractual obligations for the conservation agreements and preservation of the forest ecosystem. All deforestation permissions are documented and presented in Annex IV_BaselineScenario.

2.1.6 Project Crediting Period (G1.9)

The GPD will generate GHG emission reductions eligible for issuance as VCUs for 100 years. The crediting period starts on August 02nd, 2021 and ends on July 01st, 2121. This long-term approach is considered due to the grouped project character that allows the inclusion of new PAIs in the scope over the project lifetime.

The crediting period for each PAI presented in this 2nd MR varies from 1 to 10 years, according to the size of APD area and characteristics of suppression licenses. PAIs #1-5 are in its second monitoring period, PAIs #6-9 are in its first monitoring period.

Legal agreements (Appendix I) were signed between BRC and landowners, in order to continue the conservation activities for at least 30 years, thus, the GHG emissions reduction, biodiversity and community well-being impacts, generated by the project activities, will be monitored along the GPD longevity (30yrs).

New PAIs will have different starting dates and crediting period, based on the date of conservation contract signature and the size of the APD, respectively.

What determines the crediting period of each specific PAI is the time that would be necessary to deforest the entire APD area, thus, the PAI lifetime is a function of the APD area size and the maximum area that can be suppressed per year, based in the permits issued by the environmental agencies, in each state.

2.1.7 Project Location

The GPD geographic region covers the entire Amazon Biome and has a comprehensive geographical boundary whose objective is to encompass all rural properties with surplus of native vegetation, subject to legal suppression for the implementation of commercial activities, mainly related to pastures or annual crops.

The grouped project encompasses nine Brazilian states: Acre, Amapá, Amazonas, Pará and Roraima, and part of the territory of Maranhão, Mato Grosso, Rondônia and Tocantins (Legal Amazon).

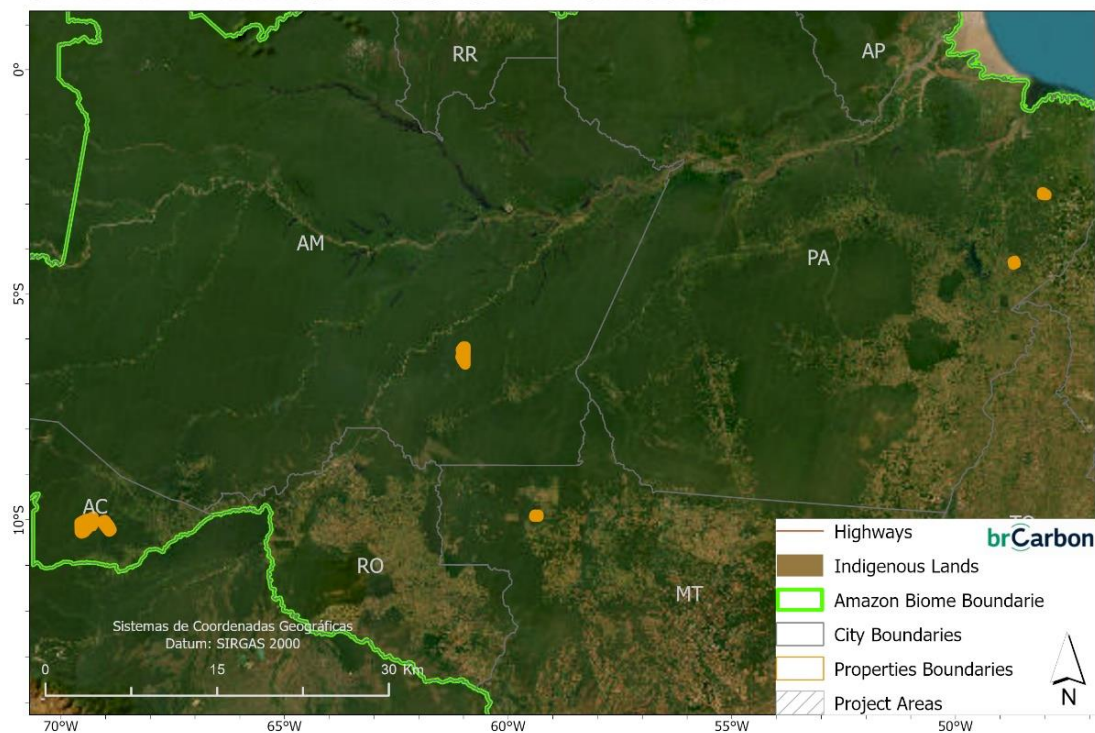
PAI#1 is located in the municipality of Aripuanã, in Mato Grosso state, and PAIs #2-5 are in the municipalities of Sena Madureira and Rio Branco in Acre. The GPD Brazilian Amazon has four new project activity instances, one in Amazon state (PAI #6), and three in Pará state (PAIs #7-9). The table below shows the centroid geographical coordinate of the project activity instances (

Table 6). Coordinates are also submitted separately as a KML file (GIS database).

Table 6. PAIs #1-9 location.

Instance	Property name	Latitude and Longitude	
PAI #1	Castanhal	-9.91	-59.41
PAI #2	Katianã	-10.27	-69.53
PAI #3	Palmares	-10.10	-69.31
PAI #4	Porongaba	-10.05	-69.04
PAI #5	Potiguar	-10.23	-69.45
PAI #6	Lagoa Grande II	-6,35	-60,10
PAI #7	Nubia Floresta	-2.78	-48.00
		-2.76	-48.04
PAI #8	Floresta 1	-2.77	-48.04
PAI #9	Fazenda Ribeiro Rondon	-4.30	-48.66

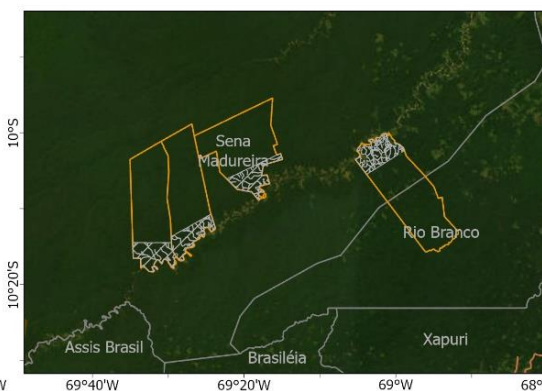
GPD APD BRAZILIAN AMAZON - PROJECT ACTIVITY INSTANCES 2022



(a) PAI#01 - Aripuanã (MT)



(b) PAI#02 to #05 - Sena Madureira (AC)



(e) PAI#09 - Rondon do Pará (PA)



(d) PAI#07 and #08 - Tomé Açu e Ipixuna do Pará (PA)



(c) PAI#06 - Lagoa Grande (AM)

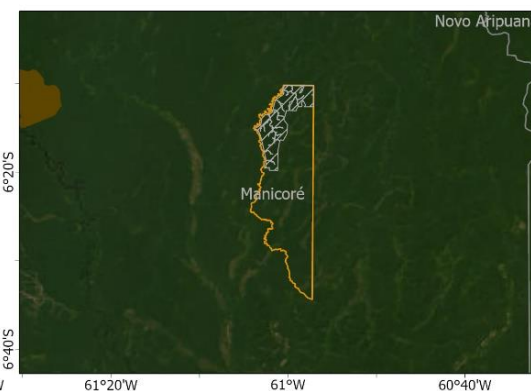


Figure 1. Brazilian Amazon APD Grouped Project location.

Table 7. PAIs #1-9 land details.

Instance	Property Name	Property area (ha)	Project area (ha)	Landholder details and user rights (SICAR number)
PAI #1	Castanhal	5,520.01	990.59	MT-5101407 4CACB40D0AE24939A317398F5FC45192
PAI #2	Katianã	25,485.86	4,728.05	AC-1200500- 448F55FB03DB45E1B5625DEC2812CB2D
PAI #3	Palmares	26,918.51	4,534.34	AC-1200500- 9B879BF4D62A42C590B9438C2EED3BB7
PAI #4	Porongaba	31,265.60	4,199.31	AC-1200500- 02402E7C20044705AFF5AC025939EEE1
PAI #5	Potiguar	24,481.70	4,213.05	AC-1200500- 607719401B924127A88A019CEEBC8ED
PAI #6	Lagoa Grande II	39,610.51	7,874.82	AM-1302702- 491F2AA961E2472EAE1F173F2DAB1D27
PAI #7	Nubia Floresta	1,395.33	233.56	PA-1503457- C6AEF45DCB934CA58917B2CA4AAAB29 F
				PA-1503457- 4232561FBB754D5EAFBF24B55C0AED59
PAI #8	Floresta 1	2,993.14	44.15	PA-1503457- A652D13A7E4648D8A55445C27992C4B7
PAI #9	Ribeiro Rondon	5,061.29	808.48	PA-1506187- 2BCED557F4D3421B964E7EBECE8D100E
Total		162,731.95	27,626.34	233.56

At project design, the section 2.1.15 described the eligibility criteria for grouped projects, where established following VCS v4.4, one of them is “where a grouped project includes multiple project activities, shall designate which project activities occur in each geographic area”.

In this monitoring period the Brazilian Amazon grouped project had an expansion of four new farms, located at Legal Amazon, at Amazonas and Para States, as it illustrated in the figure 1 above.

2.1.8 Title and Reference of Methodology

The list below references the methodology, modules and tools used in the project scope:

- **VM0007** REDD+ Methodology Framework (REDD+ MF) Version 1.6, 08 September 2020.
- **VMD0001** Estimation of carbon stocks in the above-and below ground biomass in live tree and non-tree pools (CP-AB), Version 1.1, 11 October 2013.
- **VMD0002** Estimation of carbon stocks in the dead wood pool (CP-D), Version 1.0, 03 December 2010.
- **VMD0003** Estimation of carbon stocks in the litter pool (CP-L), Version 1.0, 03 December 2010.
- **VMD0004** Estimation of stocks in the soil organic carbon pool (CP-S), Version 1.0, 03 December 2010.
- **VMD0005** (CP-W) Estimation of carbon stocks in the long-term wood products pool, Version 1.1, 20 November 2012.
- **VMD0006** Estimation of baseline carbon stock changes and greenhouse gas emissions from planned deforestation/forest degradation and planned wetland degradation (BL-PL), Version 1.3, 08 September 2020.
- **VMD0009** Estimation of emissions from activity shifting for avoiding planned deforestation/forest degradation and avoiding planned wetland degradation (LK-ASP), Version 1.3, 08 September 2020.
- **VMD0013** Estimation of greenhouse gas emissions from biomass and peat burning (E-BPB), Version 1.2, 08 September 2020.
- **VMD0015** Methods for monitoring of GHG Emissions and removals (M-MON), Version 2.2, 20 September 2020.
- **VMD0016** Methods for Stratification of the Project Area (X-STR), Version 1.4, 08 September 2020.
- **VMD0017** Estimation of Uncertainty for REDD+ Project Activities (X-UNC), Version 2.2, 08 September 2020.
- **VT0001** Tool for the demonstration and assessment of additionality in VCS agriculture, forestry, and other land use (AFOLU) project activities (T-ADD), Version 3.0 1 February 2012.
- **AFOLU Non-Permanence Risk Tool**, v4.0, 19 September 2019.

2.1.9 Other Programs (G5.9)

Not applicable. The project is not registered nor seeking registration in any other GHG program, rather than VCS and CCB. The project proponent is not interested in issuing another GHG related environmental credit. To date, the project has not sought or received another form of GHG-related environmental credit. If, in any case, a regulated market for REDD projects is created for the project area, BRC will look its endorsement.

2.1.10 Sustainable Development

The GPD project is a climate action (SDG 13) which contributes by structuring a climate solution, keeping carbon stocks on forest, resulting in forest conservation. This can promote improvements on many other SDG goals as can be seen in the table below. In this sense the project aims direct contributes through monitor the forests coverage, even though monitoring fauna campaigns that will help the target of conservation and sustainable use of biodiversity.

During the monitoring period, the GPD project undertook a series of impactful activities aimed at fostering Sustainable Development Goals (SDG). These initiatives encompassed the installation of internet towers to promote digital inclusion, execution of health campaigns and lectures focusing on preventive care and vaccinations, renovation of school infrastructure to enhance learning environments, regularization of land management to safeguard land rights, and implementation of sustainable forest management practices. These endeavors directly contribute to achieving various Sustainable Development Goals (SDGs), including Quality Education (Goal 4), Good Health and Well-being (Goal 3), No Poverty (Goal 1), Responsible Consumption and Production (Goal 12), Clean Water and Sanitation (Goal 6), Climate Action (Goal 13), Life on Land (Goal 15) and, Peace, Justice and Strong Institutions (Goal 16). By aligning with national sustainable development priorities, such as access to education, healthcare, and land rights, the project reinforces efforts to promote inclusive growth and environmental sustainability. Appendices accompanying this report provide detailed evidence of the project's significant contributions towards these goals. Furthermore, with the actions for net positive impact on communities as health, education, environment, sustainable production, the project indirectly contributes with others sustainable development goals indicators, as reported at following table:

Table 8. Sustainable Development goals, impacts and activities.

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	4.4.	4.4.1 Proportion of youth and adults with information and communications technology (ICT) skills, by type of skill	Implemented activities to increase	Increase the number of people accessing and developing technological through the installation of 4 internet tower	The project has installed 12 internet towers and more than 70 km of fiber optics cables, guaranteeing access to more than 70 families to the internet.
2)	3.7	3.7.1 Proportion of women of reproductive age who have their need for family planning satisfied with modern methods	Implemented activities to increase	Increase on female access to information throughout lectures about reproductive issues – One session of Pink October lecture	The lectures were held to around 20 women who was responsible to spread the information to others in one session of Pink October lecture
3)	3.8	3.8.1 Coverage of essential health services	Implemented activities to increase	Two health public campaigns – Pink October and Itinerant health – supported by the project	More than 500 people attended by project support on public campaigns.
4)	4.6	4.6.1 Proportion of population in a given age group achieving at least a fixed level of proficiency in functional literacy and numeracy skills, by sex	Implemented activities to increase	Renovation of two schools improving the education structure and donation of basic materials to education (02 TV's, 02 printer's and 02 computers, solar kits and water pumps)	

5)	4.a	4.a Proportion of schools offering basic services, by type of service	Implemented activities to increase	Renovation of two schools improving the education structure and donation of basic materials to education (02 TV's, 02 printer's and 02 computers, solar kits and water pumps)	Renovation and improvement of two school buildings and the donation of 02 TV's, 02 printer's and 02 computers, solar kits and water pumps
6)	1.4	1.4.1 Proportion of population living in households with access to basic services	Implemented activities to increase	Donation to 18 families of a solar kits (energy, water pumps)	Around 80 people with well being improved.
7)	1.4	1.4.2 Proportion of total adult population with secure tenure rights to land, with legally recognized documentation, and who perceive their rights to land as secure, by sex and by type of tenure	Implemented activities to increase	Mapping of 42 bona fide squatters' families interested to have their area regularized.	Around 160 people with land rights ensured.
8)	12.8	12.8.1 Extent to which global citizenship education and education for sustainable development are mainstreamed in a national education policy; curricula; teacher education; and student assessment	Implemented activities to increase	The presentation of one sustainable forest management workshop	79 farm producers involved in lectures and practices

9)	13.3	13.3.1 Extent to which global citizenship education and education for sustainable development are mainstreamed in a national education policy; curricula; teacher education; and student assessment	Implemented activities to increase	The presentation of one sustainable forest management workshop	79 farm producers involved in lectures and practices
10)	15.1	15.1.1 Progress towards sustainable forest management	Implemented activities to increase	The presentation of one sustainable forest management workshop	79 farm producers involved in lectures and practices
11)	15.2	15.2.1 Progress towards sustainable forest management	Implemented activities to increase	The presentation of one sustainable forest management workshop	79 farm producers involved in lectures and practices
12)	6.1.	6.1.1 Proportion of population using safely managed drinking water services	Implemented activities to increase	Installation and maintenance of artesian well	175 people with improved access to quality water

2.2 Project Implementation Status

2.2.1 Implementation Schedule (G1.9)

The activities developed in PAIs #1-9 are presented in the table below. The activities described comprise the monitoring period for the year 2022, however it is important to highlight that some activities, related to carbon inventory and biodiversity surveys, were carried out previously (in 2021) and were considered in this monitoring period. Activities are listed in chronological order and by type of activity (carbon measurement, biodiversity, and social and infrastructure).

Table 9. Project Implementation Schedule

Date	Milestone(s) in the project's development and implementation
05 th to 18 th of April 2021	First field visit in the Acre state Project Activity Instances (PAIs #2-5) for socioeconomic diagnosis, to present the project concept to local communities and to make the first biodiversity survey (rainy season).
30 th April to 05 th May, 2021	First site visit in Mato Grosso state Project Activity Instance (PAI #1) identify any local resident and to make the first biodiversity survey (rainy season).
30 th June 2021	Submission of the draft VCS PD in the VERRA registry system.
19 th July to 25 th July 2021	Free prior and informed consent in the PAIs #2-5.
27 th July 2021	Meeting with Municipal Health Department and State Education department in Sena Madureira in Acre state.
27 th July to 13 rd August 2021	Carbon measurement by forest inventory in PAI #1.
29 th July 2021	Meeting with State Education Department in In Rio Branco, Acre state.
30 th July 2021	Meeting with "Instituto de Mudanças Climáticas" (IMC) in Acre state.
30 th July to 25 th August 2021	Carbon measurement by forest inventory in PAIs #2-5.
02 nd August 2021	Signature of the conservation agreement between BRC and the landowner of the first five project activity instances (PAIs #1-5). The milestone that characterizes the project's start date.

Date	Milestone(s) in the project's development and implementation
04 th August 2021	Water potability analysis.
05 th August 2021	Meeting with Municipal Education Department in Sena Madureira in Acre state.
18 th August to 17 th September 2021	Public comment period in VERRA registry.
24 th August 2021	Meetings with Municipal Health Department and State Education Department in Sena Madureira in Acre state.
30 th August to 30 th October 2021	Digital inclusion: 8 towers (60m high), 1 tower (72m high), 1 tower (82m high) installed, 36 solar panels deployed, battery bank deployed, 70Km of optic fiber installed
27 th September to 03 rd October 2021	Socio-productive diagnosis with a view to rural extension, structuring of production chains and organic certification.
05 th to 06 th October 2021	Sustainable Agriculture Management field day: 15 community members were taken to 02 field days in 02 different model farms where pasture management and sustainable production with a focus on soil organic carbon were discussed.
08 th to 16 th of October 2021	Second biodiversity survey in PAI #1 (dry season).
09 th to 22 nd October 2021	Second biodiversity survey in PAIs #2-5 (dry season).
09 th to 10 th October 2021	Photovoltaic systems installed at 01 school in Porongaba.
09 th to 10 th October 2021	"Outubro Rosa": 6 health professionals from the municipal health department in Sena Madureira held two days of lectures and services focused on women's health in Seringal Porongaba.
11 th to 14 th of October 2021	Mapping for pumping systems and solar energy.
11 th to 30 th October 2021	Survey, dimensioning and installation of photovoltaic and hydraulic systems for residents of Palmares (PAI #3), Potiguar (PAI #5) and Katiana (PAI #2)

Date	Milestone(s) in the project's development and implementation
20 th to 24 th October 2021	Socio-environmental investment fund (AMAZ) field visiting.
21 st October 2021	Delivery of water filters to Porongaba communities.
20 th to 24 th October 2021	Participatory monitoring, disclosure of monitoring results, disclosure of audit date and audit process. Lectures on climate change, carbon cycle, importance of forests and ecosystem services.
20 th October 2021	Katianã and Potiguar settlements mapping.
27 th of March to 3 rd of April 2022	Public reunions with Acre public agencies.
March 25 th , 2022	Reunion with Porongaba riverside community.
March 27 th , 2022	Reunion with Porongaba center community.
March 28 th , 2022	Seringal Palmares Community reunion.
March 29 th , 2022	Beginning of chestnut tree mapping, with Avenzamaps app training.
March 30 th , 2022	Seringal Potiguar community reunion.
April 03 rd , 2022	Seringal Katianã community reunion.
May, 03 rd , 2022	Visit to the State Regional Centre of Environmental Regularization in Paragominas (SEMA/PA); Visit to the Social Assistance Municipality Secretary – SEMAS. Visit to the Science, Technology and Environmental Municipal Secretary.
May, 04 th , 2022	Visit to the Vale do Acará Agricultural Association (AAVA); Visit to the Tomé-Açu Environmental Municipal Secretary.
May 05 th , 2022	Visit to the State Agency of Agricultural Defense (ADEPARA) of Dom Eliseu; Meeting with the Rondon do Pará Rural Workers Syndicate.

Date	Milestone(s) in the project's development and implementation
May 30 th , 2022	Agreement signature between BRCarbon and Mr. Gilson Antonio Moreira Machado.
9 th May to 17 th June 2022	Carbon forestry inventory in the above ground and dead wood pools
May 11 th to June 2 nd , 2022	Forest Inventory of above-ground biomass, in Brazilian Amazon GPD APD Carbon Project areas, Paragominas-PA region. A total of 16 transects, 128 plots, (20 x 60 m) distributed throughout the municipalities of Paragominas, Ipixuna do Pará, Rondon do Pará.
June 2 nd to 11 st , 2022	EXPO Rondon event.
June 11 th , 2022	Expanding the internet cover area with 4 more towers installed in PAIs #2-5 communities' region. Four new communities are attended: Santa Luzia, Seringal Palmares, Seringal Potiguar and Seringal Katianã.
June 4 th to 16 th , 2022	First stage of social engagement to Socioeconomic surveys and diagnoses. Locations PA Águia, PA Bom Jesus, PA Irmã Dorothy, TI Barreirinha. PA - settlement project, TI - Indigenous land.
June 27 th to July 11 th , 2022	Fauna Survey on properties Capinzal I, Ribeiro Rondon, D'graus (I, II and VI) and Floresta I.
July 20 th to 24 th , 2022	EXPO AMA Marabá event.
24 th to 28 th of July 2022	Porongaba land regularization discussion. Border and center reunions.
30 th of July to 07 th of August 2022	Delivery of the expansion and renovation of State Elementary School "Iolanda Pereira Nunes".
July 29 th to August 06 th , 2022	Soil Organic Carbon and Litter field collections. A total of 128 Sample Units (permanent plots of 20x60m) distributed throughout the municipalities of Paragominas, Ipixuna do Pará, Rondon do Pará.
30 th of July to 07 th of August 2022	Delivery of the expansion and renovation of State Elementary School "Iolanda Pereira Nunes".

Date	Milestone(s) in the project's development and implementation
August 3 rd , 2022	Implementation of social diagnostic diagnosed activities by social survey, in the Bom Jesus community . of good practices and management of agricultural activities.
August 8th, 2022	Agreements signature by Mr. João Bosco Altoé Junior, including PAI #6 on the scope of the project
7 th to 22 nd of August 2022	Third biodiversity survey in PAIs #2-5 (dry season).
August 10th, 2022	Implementation of social diagnostic diagnosed activities by social survey, in the Irmã Dorothy community . Field day with rural extension of good practices and management of agricultural activities.
15 th August to 31st August 2022	Second social expedition to present the results of the diagnosis, to construct the social activities road map of the project and to present the activities to be implemented in this first monitoring period.
August 17th, 2022	Agreement signature between BRCarbon and Mr. Adão Ribeiro Soares.
August 17th, 2022	Implementation of social diagnostic diagnosed activities by social survey, in the PA Águia and Rio das Cruzes communities . Field day with rural extension of good practices and management of agricultural activities.
August 21st, 2022	Implementation of social diagnostic diagnosed activities by social survey, in the PA Diamantina communities . Field day with rural extension of good practices and management of agricultural activities.
23rd of August to 7th of September 2022	Carbon measurement by UAV LiDAR in PAIs #2-5.
5th September to 15th October 2022	Soil Organic Carbon and Litter field collection on property Lagoa Grande II. A total of 64 Sample Units (permanent plots of 20x60m) distributed throughout the municipality of Manicoré.
September 6th to 15th of October 2022	Carbon measurement by forestry inventory in the below ground and dead wood pools.
08th to 10th of September 2022	Itinerant Health.
10 th to 25 th of September 2022	Third biodiversity survey in PAI #1 (dry season).
16th September to 10st October 2022	Forest Inventory of above-ground biomass, in Brazilian Amazon GPD APD Carbon Project area, Manicoré-AM

Date	Milestone(s) in the project's development and implementation
	region. A total of 8 transects, 64 plots, (20 x 60 m) distributed throughout the municipality of Manicoré.
25 th September to 06 th October 2022	LiDAR drone flyby through PAIs #7-9 areas.
September 26th, 2022	Auditory visits for FSC validation.
November 11th, 2022	Implementation of social diagnostic diagnosed activities by social survey, in the Vila Brasil communities . Installation of an artesian well, to improve the quality and accessibility of fresh water in the community.
November 18th, 2022	Construction of an artesian well in the community Vila Brasil , Paragominas.
18th November to 1st December 2022	The first biodiversity survey in Lagoa Grande II property (rainy season).
November 25th, 2022	FSC Conservation Forest Management Certificate.

2.2.2 Methodology Deviations

According to the VCS v.4.4, section 3.17, projects may deviate from the procedures related to measurements or monitoring set out in methodologies where the proposed deviation leads to the same level of accuracy or is more conservative than what is set out in the methodology. The registered GPD has three methodology deviations:

1) CAB_{non-tree,l,t}-carbon stock in aboveground biomass in non-trees is considered as part of the average aboveground biomass stock subjected to burning (Bi,t) in VMD0013 v1.2, equation 2 in the baseline and project scenarios. The proposed methodology deviation relates to measurement and monitoring procedures and leads to more accurate estimates once this carbon pool is expected to be burned in the baseline scenario. For additional information see Appendix II (Calculus tables).

2) An initial participatory rural appraisal (PRA) of the communities inside and surrounding the project area was performed to determine if there was the potential to occur illegal logging activity. Considering GPD initial scope, it remained characterized that all families living inside the project area explore the forest for timber and fuel wood, what shall be considered as a low impact activity driven by subsistence purposes. No timber or fuel wood economic activity was identified by BRC field team. In this sense, BRC will assume that extraction of trees for timber or fuelwood is a constant in PAIs where there are communities inside.

Rather than making a PRA every two years, BRC will monitor the forest degraded area annually considering the protocols established in this monitoring plan. This constitutes a methodology deviation which leads to more accurate and conservative estimates since significance of timber and fuel wood extraction GHG related emissions will always be tested.

3) Monitoring period: The first monitoring period extends from August 2nd (project start date) to October 19th, 2021 (first monitoring report closing date). BRC proposes a methodology deviation related to the minimum duration of a monitoring period, to be applicable only in the first monitoring event.

Considering that this is a REDD+ APD project, GHG emissions in the baseline scenario would occur in the same period (from August to October) as the monitored period, that refers to the dry period in Amazonia, where logging and forest suppression is feasible, which is evidenced by the project start date (dry period in Amazonia), by operational and financial capacity of the landowner, through contracts signed with service providers for vegetation suppression and also through spatial analysis in other areas of the landowner property. The project GHG emissions, in turn, cannot be considered as underestimated as the project excludes all deforested areas within the properties, in the last 10 years, from the project area. In this way, the reduction of forest area affects the estimates negatively anyway. GHG emissions due to activity shifting leakage were considered as zero in the first year, because of the current project scope, which characterizes the absence of legally suppressible forest areas on other farms owned by the landowners. Finally, market effects leakage varies in function of the volume of timber projected to be extracted from the project boundary, during the baseline and would be the same for the first vintage, regardless of the length of the monitoring period (if 3 or 12 months).

Thus, with the proposed deviation, the project will achieve the same level of accuracy in GHG estimates. The deviation will not negatively impact the conservativeness of the quantification of GHG emission reductions.

Regarding the D% planned parameter deviation, in accordance with the methodological deviation requirements, stated in VCS standard 4.7, section 3.20, this deviation aligns with the criteria and procedures related to monitoring and measurement set out in the applied methodology. The deviation ensures that the data used remains accurate and conservative, without negatively impacting the quantification of reductions or removals. As allowed by the methodology, this deviation has been duly considered and justified based on the circumstances of the project.

The methodological deviation concerns the D%planned parameter, which defines the deforested area per property per year. According to the VM0006 methodology, section 5.1.3, item 6, deforestation in the proxy area must have occurred within the 10 years prior to the baseline period. However, for the calculation of the parameter used in this project, one of the Vegetation Suppression Authorizations (ASV) used to

define the D%planned was issued and executed in the first years of the project's baseline, which is 2022 and 2023. Although the execution of the ASV began in 2022, it extends into 2023.

Given that this document is officially authorized by government institutions and accurately reflects the reality of the project area, this authorization was considered eligible and plausible for use in the parameter calculation. Additionally, the authorization is valid and consistent with the reality in the Amazon, thus justifying its use in the context of this project.

2.2.3 Minor Changes to Project Description (Rules 3.5.6)

One minor change to the project description occurred during the monitoring period. Previously, was predicted the implementation of monitoring towers with cameras capable of detecting smoke patterns automatically. However, this activity was excluded from it because it is understood that this fire detection methodology, although being an effective technology, is not an interesting strategy considering that it is a sensitive to the social perspective, once that could lead to conflicts with the local community. BRC understands that it is part of the local way of life and common practice to open areas for cattle raising, however, we need to act on this subject in a broader way, in the awareness and local training, in the management and control of fire and pastures so that new openings and deforestation in the territory are not necessary. We must highlight that this work takes time and construction, once it is related to cultural issues that are not easy to modify, so, we intend to dedicate the next years of implementation to strengthening this important issue of wildfires GHG emission reduction subject.

2.2.4 Project Description Deviations (Rules 3.5.7 – 3.5.10)

2.2.4.1 Allometric Equation

The aboveground carbon estimates were updated in this monitoring report using a new and more accurate allometric equation. This equation, developed by Chave et al. (2014), has gained widespread use in studies of forest biomass in Brazil and other tropical regions. It offers several advantages over the previous Nogueira et al. (2008) equation, including the incorporation of two additional parameters besides tree diameter: an environmental coefficient for estimating tree height and tree wood density. Furthermore, this equation is predominantly used in carbon stock estimates utilizing LiDAR remote sensing. While LiDAR has been applied in some Project Activity Instances (PAIs), enhancing the sampling and accuracy of carbon stock estimates, it has not yet been implemented across all PAIs due to logistical limitations. However, it is our goal to eventually employ LiDAR technology in all PAIs of the project to ensure the highest level of precision and reliability in our carbon stock assessments. Detailed information is available in Appendix IV ("Carbon Pool Measures"). Below, we list some reasons for transitioning from the Nogueira et al. (2008) equation to the Chave et al. (2014) equation:

- The equation has significant international relevance, evidenced by its presence in numerous scientific articles in the field of forest measurement, with over 2000 citations.

- It was developed using an extensive database from 58 sites across different physiognomies in the tropics, derived from 43 scientific studies (including same dataset from Nogueira et al. (2008)). This includes significant allometric information from forests in the Brazilian Amazon, where our project is located.

- Its pantropical nature allows for widespread use across various tropical physiognomies, enabling methodological standardization in voluntary carbon market projects.

- It is the primary allometric equation found in key scientific articles addressing forest monitoring and measurement using LiDAR technology (e.g., Longo et al. 2016, Duncanson et al. 2022, Asner et al. 2014, Baccini et al. 2017). See References in Appendix IV.

- It is the main peer-reviewed article used for above and below-ground tree biomass estimates in Brazil's Fourth National Communication - National Greenhouse Gas Emissions Inventory, specifically in the AFOLU sector report by the Ministry of Science and Technology.

- The equation includes a regional environmental factor that significantly influences the allometric relationship of trees, making it more site-specific.

- It incorporates a wood density factor, which is crucial in carbon calculation, adding another layer of site specificity.

- The equation is robust ($r^2=0.9$), sampling over 4,000 arboreal individuals, representing a significant and wide range (DBHs between 5 cm and 212 cm), especially, large samples in larger trees.

Although the equation adjustment doesn't impact in the applicability of the methodology, this also does not affect the additionality of the project, nor the baseline scenario adopted, since even though there is a subtle increase in the potential for VCU generation, due to the adoption of a more precisely allometric equation, this does not interfere with the baseline scenario adopted by the project, nor with the hypothetical conservation scenario, without carbon project activities. It is important to highlight that any change generated due to this deviation can only have an impact on the project activity scenario, which does not have any implications in the scope of additionality.

While the Nogueira equation is specifically tailored to the Brazilian Amazon, it is important to consider the broader representativeness and robustness of the Chave equation. Despite Nogueira's regional specificity, the Chave equation encompasses a larger and more diverse sample size, including a significant number of individuals from the Amazon region. This extensive dataset, covering a wide range of diameters from 5 cm to 212 cm, ensures a more comprehensive representation of tree sizes and types, particularly

for larger trees which are critical in total carbon stock assessments. The Chave equation's broader scope, combined with its inclusion of additional environmental and density parameters, ultimately provides a more accurate and representative model for our project's diverse forest landscapes. This enhanced representativeness is further illustrated by the fact that, while the Nogueira equation includes about five individuals above 80 cm DBH, the Chave equation includes over 180 individuals, a third of which are from South America. By applying the Chave equation to these individuals in South America, larger than 80 cm, we obtained an $R^2 = 0.66$, whereas the Nogueira equation achieved an $R^2 = 0.39$. This highlights the limitations of the Nogueira equation in estimating carbon in individuals with large DBH, which are crucial for total stock assessments. Although the Chave estimates showed differences of less than 5% compared to the previously verified estimates in MR1 (PAIs #1-5), we opted to switch to the Chave equation due to all the evidence listed above. We believe that this change brings more standardization and accuracy to our long-term grouped project, especially in conjunction with the use of LiDAR technology. This decision aligns with PP commitment to employing the most reliable and up-to-date methods in our carbon stock assessments, ensuring that our carbon estimates are as precise and reliable as possible.

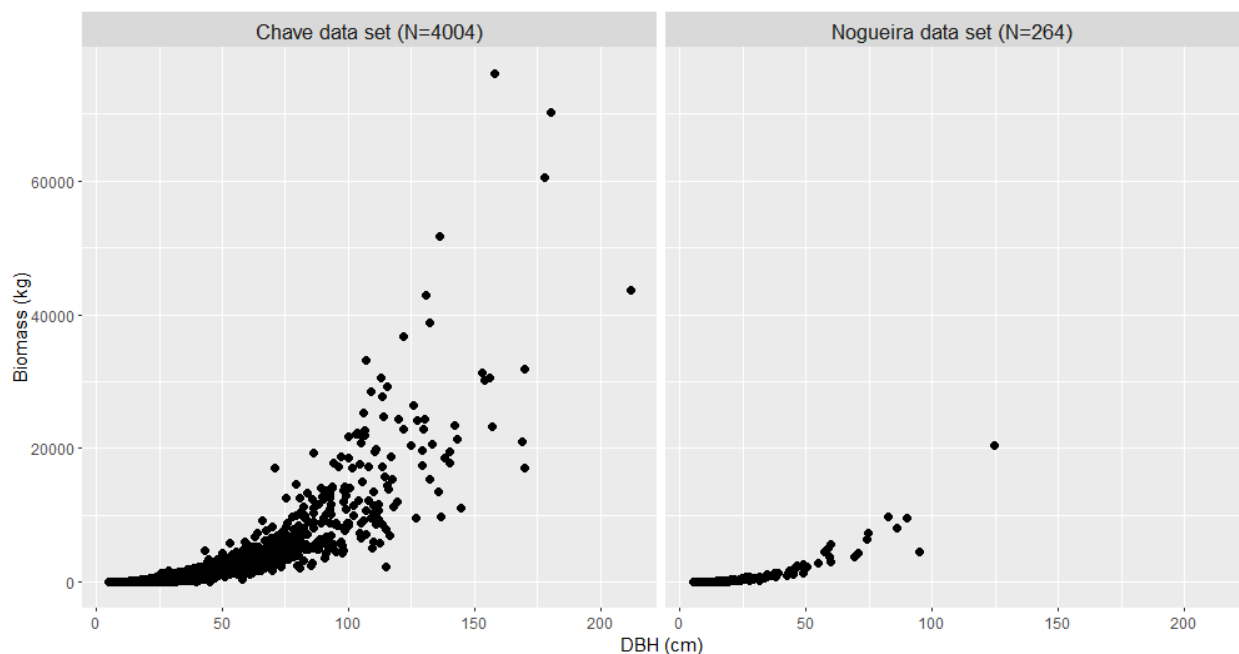


Figure 2. Chave and Nogueira equations in comparison of quantity of sample data - number of trees - applied in allometric models.

2.2.4.2 Biodiversity Gold Level

Another project description deviation is related to the inclusion of the project in the Gold Level Criteria for Exceptional Biodiversity Benefits. We are seeking to include the project in the Gold Level by meeting the vulnerability criteria established in the Climate, Community & Biodiversity Standards: v3.1 (GL3.1.a). The biodiversity monitoring demonstrated that four species found within the project area are classified, by

the IUCN Red List, as facing high risk of global extinction. These species trigger the vulnerability criteria and classify the project area as a Key Biodiversity Area (KBA) (Langhammer et al. 2007). One species is classified as Critically Endangered (CR): the bird *Psophia obscura*. Whereas three species are classified as Endangered (EN): the spider monkey *Ateles chamek*, the river dolphin *Inia geoffrensis* and the Giant Otter *Pteronura brasiliensis*. For more information about the trigger species ecology and population trends please refer to section 5.4 of the present monitoring report. The complete information about the IUCN Red List assessment, species geographic range map, population trend, threats and ecological characteristics are available in Appendix III - Biodiversity. The table shows the occurrence of each trigger species within the project instances.

Table 10. Endangered species found within the project area and their respective popular name, class, IUCN Red List classification and location of occurrence.

Species	Nome popular	Class	IUCN Red List Status	Occurrence			
				PAI #1	PAIs #2-5	PAI #6	PAIs #7-9
<i>Ateles chamek</i>	Black-faced Black Spider Monkey (macaco-aranha-de-cara-preta)	Mammal	EN	x	x	x	
<i>Inia geoffrensis</i>	Amazon River Dolphin (boto-vermelho)	Mammal	EN			x	
<i>Pteronura brasiliensis</i>	Giant Otter (ariranha)	Mammal	EN			x	
<i>Psophia obscura</i>	Black-winged Trumpeter (jacamim-de-costas-escuras)	Ave	CR				x

2.2.4.3 New Entity Inclusion

In this monitoring period there was a change in the implementation partner of PAIs #1-5, changing from BATISTA E CIA LTDA to Yaco2 Gestão e Comércio de Carbono. These two companies are both owned by the same owners. The owners use BATISTA E CIA LTDA company to manage his rural properties, and after noticing a high demand in the region for the carbon market, the owners established the Yaco2 Gestão e Comércio de Carbono company to operate in the carbon market. The management of the company owner's business is his sole liberality.

Project 2551 is a grouped and scalable project. Therefore, it is natural that new owners of rural properties enter the scope of the project over time, with the inclusion of new PAIs.

During the expansion of the project and the introduction of new Project Activity Instances (PAIs), the project proponent has successfully identified potential new entities involved and stakeholders. These entities are poised to become integral partners as landowners, and/or actively participate in the implementation of project activities. In this sense, we have included the Incorporadora Manicoré LTDA company as implementation partner and landowner of PAI #6, Mr. Gilson Antônio Moreira Machado as the implementation partner and landowner of PAI #7 and #8, and Mr. Adão Ribeiro Soares as the implementation partner and landowner of PAI #9.

2.2.5 Grouped Projects

1) NEW PROJECT AREAS AND COMMUNITIES (G1.13)

At this monitoring period, the PP has included 4 new Project Activity Instances (PAIs) in the Brazilian Amazon Grouped Project scope, as described in table below.

Table 11. New Project Activity Instances;

Instance	Property name
PAI #6	Lagoa Grande II
PAI #7	Nubia Floresta
PAI #8	Floresta 1
PAI #9	Fazenda Ribeiro Rondon

Regarding PAI #6

No families or communities live or access the PAI #6. The Lagoa Grande II farm is in high Matauará River which is the only access route to the farm. The river runs in front of Pinatuba Indigenous land and of Curara village.

The indigenous land of Pinatuba is located at the entrance near the mouth of the Matuará River which flows into the Madeira, is 50 km as the crow flies and 165 km on the winding path of the river from the project area. The Pinatuba was mapped and communicated due to its location on the project's path, but it was not included in the project scope due to the PP stakeholder engagement protocol (07_Appendix VII_Communities). Curara village, being the closest community to the project area and the most vulnerable in the Matauará river region, was prioritized instead.

Regarding PAIs #7-9

In Pará region three new project areas were included (PAIs #7-9). There are no families living inside these areas. However, some communities are located around the project areas and will access benefits from the Brazilian Amazon APD GP.

The identified community groups can be divided into three categories: Settlement Project, Townships, and Indigenous Territory. They are located close to rural properties and project areas. Proximity varies from the direct boundary between properties, passing through rivers that separate them, to areas that are distant because they have other properties between them. All of them were included in the project scope due the PP community prioritization criteria what meant the entrance of the communities and territories - Barreirinha Indigenous Land; Águia Settlement Project; Diamantina II Settlement Project; Bom Jesus Settlement Project; Irmã Dorothy Settlement Project; Concrein II Settlement Project; and the Brasil Village township – to implement project activities.

Regarding the Stakeholder Identification Process As the ordinary practice of the PP, the stakeholder identification process applied to all PAIs under the GPD and presented in the past Project Description, consists in use secondary information available in the IBGE GIS database and in field research through the application of semi-structured questionnaires, photographic records, and observations, collected through direct contact with communities living within the project areas, in a way to understand the way of life, experiences, territorialization and the history of these communities.

The stakeholder identification process represents the first of four stages of a social engagement protocol executed by BRC. The other three stages represent participatory workshops for project design and FPIC achievement, participatory monitoring and dissemination of monitoring results, respectively.

2) REMOVED PROJECT AREAS AND COMMUNITIES (G1.13)

Not applicable. No areas or communities have been removed from project areas.

3) ELIGIBILITY CRITERIA FOR GROUPED PROJECTS (G1.14)

Regarding the Eligibility Criteria for Grouped Projects and the Inclusion of new PAIs, following the VCS v4.4 and CCB third version criteria.

"3.5.15: Grouped projects shall include one or more sets of eligibility criteria for the inclusion of new project activity instances. At least one set of eligibility criteria for the inclusion of new project activity instances shall be provided for each combination of project activity and geographic area specified in the project description. A set of eligibility criteria shall ensure that new project activity instances":

- 1) Meet the applicability conditions set out in the methodology applied to the project: all PAIs under

the GPD must meet the applicability conditions set out in the methodology VM0007 v1.6. Regarding new PAIs #6-9, the applicability conditions are met as demonstrated:

- The 4 new PAIs have no areas registered under the CDM or under any other GHG program.
 - All lands included in the 2nd MR are qualified as native primary forest, according to the Brazilian forest definition.
 - Baseline deforestation and forest degradation in the project area fall within the category “Planned deforestation/degradation”.
 - Leakage avoidance activities in the PAIs #6-9 do not include agricultural lands that are flooded to increase production, neither livestock production through use of feed-lots and/or manure lagoons.
 - The baseline scenario for all the PAIs applied under this GPD are based in the legal conversion of forest lands to non-forest lands, according to the applicable law.
- 2) Use the technologies or measures specified in the project description: sections 3.13, 4.3.1 and 5.3.1 define the technologies and measures available. The GHG emissions reductions will be caused by the signing of long-term forest conservation agreements with landowners in all PAIs. Complementary activities related to leakage mitigation, social and biodiversity related activities and monitoring activities are also described in section 3.13, 4.3.1 and 5.3.1.
 - 3) Apply the technologies or measures in the same manner as specified in the project description: new PAIs have applied the same technologies or measures specified in the PD. Small adjustments area allowed to accommodate new PAI specificities. Any adjustment will be reported, described, and must not overestimate the project climate.
 - 4) Are subject to the baseline scenario determined in the project description for the specified project activity and geographic area: the grouped project assumes the Legal Amazon as a unique wide geographic area, taking into consideration that all private properties within this biome are subject to the same legal framework.
 - 5) Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area: considering that the grouped project refers to avoidance planned deforestation (APD) in areas where the forest suppression is permitted by law, all the subsequent project activity instances submitted under this GPD follows the same additionality approach presented in section 3.5 of the PD. It means that the plausible baseline scenarios will not differ from the three scenarios identified in the additionality analysis, as follow:
 - a. Forest cover maintenance of 20% of the property in Amazon biome and 65% in Cerrado, where the land use conversion is allowed by law, i.e.: through conservation activities resulting from incentives other than the REDD APD project.
 - b. Legal deforestation of 20% of the property in Amazon biome and 65% in Cerrado, (deforestation with permits), where the land use conversion is allowed by law for i.e.: pasture (cattle raising) and agriculture.

- c. Illegal deforestation of 20% of the property in Amazon biome and 65% in Cerrado, (deforestation without permits), where the land use conversion is allowed by law, for pasture (cattle raising) and agriculture purposes or simply for real estate speculation.

“3.5.16: “Grouped projects provide for the inclusion of new project activity instances after the initial validation of the project. New project activity instances shall:”

1) Occur within one of the designated geographic areas specified in the project description: the GPD has assumed only one wide geographic area, where PAIs can occur. This geographic area encompasses all the private properties legally constituted in the Amazon biome, with surplus of forest cover, as per the federal law 12.651, from May 2012.

2) Comply with at least one complete set of eligibility criteria for the inclusion of new project activity instances: the set of eligibility criteria for the inclusion of a new project activity instances, is the following:

a. Regularized rural properties within the Legal Amazon with forest coverage greater than 80% in Amazon biome and 35% in Cerrado.

b. A landowner must have signed a long-term forest conservation agreement with the BRC.

c. New PAIs, have a valid vegetation suppression license approved by the state environmental agency, or at least a submission protocol to this agency (as required by the VMD0006 v1.2), to obtain the deforestation permits, according to the federal law 12,651.

3) Be included in the monitoring report with sufficient technical, financial, geographic, and other relevant information to demonstrate compliance with the applicable set of eligibility criteria and enable sampling by the validation/verification body: this document was prepared based on the PD, and monitoring report VCS template and covers PAIs #1-9.

4) Be validated at the time of verification against the applicable set of eligibility criteria: each new project activity instance included in the grouped project, is being validated against the applicable set of eligibility criteria, stated in the item 2 above, by the time of the grouped project verification.

5) Have evidence of project ownership, in respect of each project activity instance, held by the project proponent from the respective start date of each project activity instance: evidence of project ownership is defined as the second eligibility criteria, as mentioned in item 2 above.

6) Have a start date that is the same as or later than the grouped project start date: according to the VCS start date definition, the start date of each activity instance will be the date of the protection plan implementation commencement which, in its turn, according to VMD0006 v1.2, is dependent on the

issuance (or issuance request) of a legal permit for deforestation to the relevant government department. At this moment, the protection plan, represented by the project area long-term conservation agreement, was implemented for all PAIs. In this sense, it is characterized that the start date of a new project activity instance will always be later than or equal to the start date of the grouped project, as for PAIs #6-9.

7) Be eligible for crediting from the start date of the instance through to the end of the project crediting period: the crediting period of new PAIs was defined according to the specific PAI baseline, which in its turn, will be determined in function of the area potentially deforested and the rate of planned deforestation, following VMD0006 v1.2 criteria. For more information on baseline determination, see section 3.4 of the PD.

Regarding eligibility criteria for the CCB standard third version

- 1) Adoption of project activities specified in the project description and applied in the same manner as specified in the project description.

All activities developed during this monitoring period were implemented in the same manner as specified in the project description. Throughout the development and implementation of the activities, the project proponent reviewed the social engagement protocol, aiming to improve and strengthen it, making the protocol more accessible and comprehensive.

- 2) Subject to the climate, community and biodiversity without-project scenarios as determined for the project.

Each of the subjects to the climate, community and biodiversity are described on their respective sections 3, 4 and 5.

- 3) Have similar characteristics with respect to additionality.

GPD additionality was assessed according to VT0001 v3.0. This tool was adapted from the CDM “Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities” (Version 02) and provides a stepwise approach to demonstrate additionality in VCS AFOLU projects. More information about the additionality characteristics is presented above, in section 2.2.5 on title 1), and at the 3.5 section of the Project Description.

- 4) Subject to the same processes for stakeholder engagement described in G3 and respect for rights to lands, territories and resources including free, prior and informed consent described in G5”The project proponent implemented the community prioritization protocol and the social engagement protocol, which were designed and developed based on the CCB third version, focusing primarily

on the elements described in G3 and G5. This ensures that stakeholder engagement is conducted more respectfully, safeguarding the respect for rights to lands, territories, and resources.

5) Have similar monitoring elements.

The monitoring elements did not differ from those observed on the first five (5) PAIs implemented on the PD and 1st MR. All the monitoring elements, as well as the monitoring plan, are presented on respective sections from climate - 3.1.3, community - 4.3 and biodiversity - 5.3.

All new instances occur in the Legal Amazon, at designated geographic area specified in the project description at Amazonas and Pará States, and have the same characteristics with respect to additionality, that are consistent with the initial instances (Legal deforestation of 20% of the property in Amazon biome and 65% with deforestation permits), where the land use conversion is allowed by law to activities common practices as pasture (cattle raising) and agriculture.

The only project activity considered in the scope of the grouped project, for which carbon credits generation is attributable, in line with the methodology adopted and applicable to all instances, is avoiding planned deforestation.

To avoid planned deforestation BRC sign long-term conservation agreements with landowners and demonstrate compliance with the applicable set of eligibility criteria, the relevant and additional information can be seen in the specific regional MR, attached to this report, as well Appendix I (Conservation Agreements), Appendix V Monitoring_2_2022), Appendix VI (GPD_Requirements), and Annex I – Land Tenure.

The new instances included in this monitoring period meet the applicability conditions set out in the methodology (VM007 v1.6) applied to the project, uses the measures, and applies technologies, the same manner, as specified at project description.

PAI #6 is located on private land, as already mentioned there are no communities living within the project areas, nor accessing it.. The local conditions prior to the start of the project are the same as in the baseline scenario, i.e., agricultural and livestock projects that are being planned or implemented and for which deforestation permits have been applied for or already issued by the relevant environmental authority.

Regarding PAIs #7-9, the conditions prior to project initiation are the same as those identified on the baseline scenario, that is, agricultural and cattle ranching projects in planning or implementation stages for which deforestation authorizations have been issued by or requested to the responsible environmental agency in each state.

The table below list the stakeholders identified related to the new project activity instances at Pará state region (PAIs #7-9) and demonstrate how they met eligibility criteria. For better comprehension please see the design of GPD APD Brazilian Amazon project description, in section 2.1.15, or the refers updated version of VCS Standard ¹: (section 3.6.1 to 3.6.17).

Table 12. Stakeholder identification on PAIs #6-9.

Stakeholder	Rights, interest, and overall relevance to the project	Demonstrate how they meet the eligibility criteria (G1.14)	Demonstrate how their inclusion does not violate the scalability limits (G1.15)
PAI #6			
Incorporadora Manicoré LTDA	Landowners of new project activity instances	- All landowners within the Legal Amazon have the right to convert up to 20% of the forest area (or 65% of the Cerrado) in their private properties for economic purposes.	- The grouped project is limited due to the total area of private properties with forest cover exceeding the legal reserve in the Legal Amazon (5,364,100Km²).
		- Have evidence of project ownership and sign conservation agreements.	- The project activity instances might encompass any private properties legally constituted, with forest cover surplus considering the thresholds established by the federal law.
		- The new project areas occur in the rural properties located at Legal Amazon designated geographic area.	
		- Are subject for the same legal framework and deforestation agents, regularized rural properties with legal permission to deforestation and have similar characteristics with respect to additionality and baseline scenario.	

¹ The set of eligibility criteria refers to VCS Standard version 4.4 : <https://verra.org/wp-content/uploads/2022/12/VCS-Standard-v4.4-FINAL.pdf>

Curara village	The Curara village is a community that lives along the Matauará river, which describes itself as indigenous, and was studied for recognition as an extension of indigenous land. There are also several other isolated residents upstream. They are not directly connected to the project area, but they have a strong relationship and concern with the surrounding territory and its natural resources.	The approach and development of activities with this community will follow the pattern suggested by the PP Social Engagement Protocol, following the CCB 3 rd version and the VCS v4.4 guidelines, which will be applied in the same manner specified in this project PD, with the development of activities based on the demands brought by community members.	Due to the scarcity of nearby communities and the potential indirect impacts our carbon project might generate in the TI Pinatuba area, the PP chose to strategically expand the project scope to include new communities. This decision is aligned with our scalability limits and is aimed at enhancing sustainability. It also addresses the critical need for support in the distribution of manufactured products and compensates for the lack of public assistance, ensuring that our expansion does not compromise the project's goals.
Pinatuba indigenous Land	The Pinatuba is an Indigenous Land located in Manicoré nearby the PAI #6, however they have not directly connection with the instance areas. The territory was mapped following the Protocol of Criteria for Prioritizing Communities, which defines the communities to be part of the project activities.	Due the social, political and environmental characteristics of this territory the choice of making them part of the project is directly related to the possibility to generate real impact on their reality, thus, following internal protocols it meets with eligibility criteria on support on improvement on climate, community and biodiversity issues.	Throughout the use of technological tools, the building with an institutional relationship and articulation with legitim representants of the territory (associations), beyond the constant presence of one of our local representants makes the participation of this territory possible in the project scalability limits.
SESAI - Special Secretary of Indigenous Health /DSEI – Special Indigenous Health District	The indigenous people in Brazil have a proper health system adapted to their culture, in this sense any contact with indigenous communities requires a direct contact with them.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.

FUNAI - National Foundation of Indigenous People	It is the institution responsible to indigenous issues in Brazil, which manage the indigenous territories, thus a necessary interlocutor to relate with indigenous lands.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same. To develop any activity in indigenous lands and with indigenous people the Brazilian law requires an interlocution with the foundation.
Educational Municipal Secretary of Manicoré	It is the institution responsible to the municipal education public police.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.
Social Assistance Municipal Secretary of Manicoré	It is the institution responsible to the municipal social assistance public police.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.
Environmental Municipal Secretary of Manicoré	It is the institution responsible to the municipal environmental public police.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.
Health Municipal Secretary of Manicoré	It is the institution responsible to the municipal health public police.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.
OPITTAMPP - Organization of Indigenous Peoples Torá, Tenharin, Apurinã, Mura, Parintintin and Pirahã	It is the representative institution of some indigenous people	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.
SEMA/AM - Amazonas State	It is the institution responsible to the state environmental public police.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.
IDAM - Institute for Sustainable Agricultural and Forestry Development of the State of Amazonas	It is the institution responsible to the state agricultural and forestry public police.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.

PAIs #7-9			
Mr. Adão Ribeiro	Landowners of new project activity instances	- All landowners within the Legal Amazon have the right to convert up to 20% of the forest area (or 65% of the Cerrado) in their private properties for economic purposes.	- The grouped project is limited due to the total area of private properties with forest cover exceeding the legal reserve in the Legal Amazon (5,364,100Km²).
		- Have evidence of project ownership and sign conservation agreements.	- The project activity instances might encompass any private properties legally constituted, with forest cover surplus considering the thresholds established by the federal law.
- The new project areas occur in the rural properties located at Legal Amazon designated geographic area.			
Mr. Gilson Machado		- Are subject to the same legal framework and deforestation agents, regularized rural properties with legal permission to deforestation and have similar characteristics with respect to additionality and baseline scenario.	

PA Águia	The PA Águia is a Federal Settlement Project located in Paragominas nearby the PAI #9,, however they are not directly connected with the instance areas. The territory was mapped following the Protocol of Criteria for Prioritizing Communities, which defines the communities to be part of the project activities.	Due the social, political and environmental characteristics of this territory the choice of making them part of the project is directly related to the possibility to generate real impact on their reality, thus, following internal protocols it meets with eligibility criteria on support on improvement on climate, community and biodiversity issues.	Throughout the use of technological tools, the building with an institutional relationship and articulation with legitim representants of the territory (associations), beyond the constant presence of one of our local representants makes the participation of this territory possible in the project scalability limits.
PA Bom Jesus	The PA Bom Jesus is a Federal Settlement Project located in Rondon do Pará nearby the PAI #9, however they are not directly connected with the instance areas. The territory was mapped following the Protocol of Criteria for Prioritizing Communities, which defines the communities to be part of the project activities.	Due the social, political and environmental characteristics of this territory the choice of making them part of the project is directly related to the possibility to generate real impact on their reality, thus, following internal protocols it meets with eligibility criteria on support on improvement on climate, community and biodiversity issues.	Throughout the use of technological tools to monitor social data, the building with an institutional relationship and articulation with legitim representants of the territory (associations), beyond the constant presence of one of our local representants makes the participation of this territory possible in the project scalability limits.
PA Diamantina II	The PA Diamantina II is a Federal Settlement Project located in Ipixuna do Pará nearby the PAI #7 and PAI #8, however they are not directly connected with the instance areas. The territory was mapped following the Protocol of Criteria for Prioritizing Communities, which defines the communities to be part of the project activities.	Due the social, political and environmental characteristics of this territory the choice of making them part of the project is directly related to the possibility to generate real impact on their reality, thus, following internal protocols it meets with eligibility criteria on support on improvement on climate, community and biodiversity issues.	Throughout the use of technological tools, the building with an institutional relationship and articulation with legitim representants of the territory (associations), beyond the constant presence of one of our local representants makes the participation of this territory possible in the project scalability limits.

PA Irmã Dorothy	The PA Irmã Dorothy is a Federal Settlement Project located in Rondon do Pará nearby the PAI #9, however they have not directly connection with the instance areas. The territory was mapped following the Protocol of Criteria for Prioritizing Communities, which defines the communities to be part of the project activities.	Due the social, political and environmental characteristics of this territory the choice of making them part of the project is directly related to the possibility to generate real impact on their reality, thus, following internal protocols it meets with eligibility criteria on support on improvement on climate, community and biodiversity issues.	Throughout the use of technological tools, the building with an institutional relationship and articulation with legitim representants of the territory (associations), beyond the constant presence of one of our local representants makes the participation of this territory possible in the project scalability limits.
TI Barreirinha	The TI Barreirinha is an Indigenous Land located in Paragominas, , however they have not directly connection with the instance areas. The territory was mapped following the Protocol of Criteria for Prioritizing Communities, which defines the communities to be part of the project activities.	Due the social, political and environmental characteristics of this territory the choice of making them part of the project is directly related to the possibility to generate real impact on their reality, thus, following internal protocols it meets with eligibility criteria on support on improvement on climate, community and biodiversity issues.	Throughout the use of technological tools, the building with an institutional relationship and articulation with legitim representants of the territory (associations), beyond the constant presence of one of our local representants makes the participation of this territory possible in the project scalability limits.

Vila Brasil	The Brasil Village is an ordinary area with no special regimentation as the settlements and the indigenous land in Ipixuna do Pará nearby the PAI #7 and PAI #8, however they are not directly connected with the instance areas. The territory was mapped following the Protocol of Criteria for Prioritizing Communities, which defines the communities to be part of the project activities.	Due the social, political and environmental characteristics of this territory the choice of making them part of the project is directly related to the possibility to generate real impact on their reality, thus, following internal protocols it meets with eligibility criteria on support on improvement on climate, community and biodiversity issues.	Throughout the use of technological tools, the building with an institutional relationship and articulation with legitim representants of the territory (associations), beyond the constant presence of one of our local representants makes the participation of this territory possible in the project scalability limits.
APRUJ – Associação dos Produtores Rurais	Association of the union of settlements PA Bom Jesus, PA Urutum and PA Jerusalem of Rondon do Pará has approximately 95 members, covering around 200 families assisted	Not applicable	BRC does not recognize capacity limits of economic or managerial nature, nor thresholds for project expansion beyond which there may be negative impacts on biodiversity, nor community. VM0007 v1.6 methodology, used in the VCS GPD, does not state any limit for project size or number of instances.
SEMA – Sustainable and Environment State Secretary of Pará	It is the institution responsible to the state environmental public police.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.
Educational Municipal Secretary of the municipalities of: Dom Eliseu; Ipixuna do Pará; Paragominas; Rondon do Pará; Ulianópolis.	They are the institutions responsible to the municipal educational public police.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.

Social Assistance Municipal Secretary of the municipalities of: Dom Eliseu; Ipixuna do Pará; Paragominas; Rondon do Pará; Ulianópolis.	They are the institutions responsible to the municipal social assistance public police.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.
Environmental Municipal Secretary of the municipalities of: Dom Eliseu; Ipixuna do Pará; Paragominas; Rondon do Pará; Ulianópolis.	They are the institutions responsible to the municipal environmental public police.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.
Health Municipal Secretary of the municipalities of: Dom Eliseu; Ipixuna do Pará; Paragominas; Rondon do Pará; Ulianópolis.	They are the institutions responsible to the municipal health public police.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.
ADEPARÁ – State Agency of Agricultural Defense	It is the institution responsible to the state agricultural issues.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.
Rondon do Pará Rural Workers Syndicate	It is the representative institution of rural workers	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.
INCRA - National Institute of Colonization and Agrarian Reform	It is the institution responsible to the federal land public police.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.

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ITERPA – Pará Land Institute	It is the institution responsible to the state land public police.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same.
FUNAI - National Foundation of Indigenous People	It is the institution responsible to indigenous issues in Brazil, which manage the indigenous territories, thus a necessary interlocutor to relate with indigenous lands.	Not applicable	The contact with them does not increase the size of the project, thus the scalability remains the same. To develop any activity in indigenous lands and with indigenous people the Brazilian law requires an interlocution with the foundation.

4) SCALABILITY LIMITS FOR GROUPED PROJECTS (G1.15)

The GPD project is limited due to the total area of private properties with forest cover exceeding the legal reserve in the legal Amazon. BRC does not recognize capacity limits of economic or managerial nature, nor thresholds for project expansion beyond which there may be negative impacts on biodiversity, nor community. VM0007 v1.6 methodology, used in the VCS GPD, does not state any limit for project size or number of instances.

5) RISK MITIGATION FOR GROUPED PROJECTS (G1.15)

Not applicable. The project cannot be expanded beyond its scalability limit. The climate, community and biodiversity benefits risk mitigation measures identified in this document are applicable to all PAIs.

6) Project Zone Map (G1.13)

For PAIs #1-5, please refer to section 2,1,7, above.

Regarding PAI #6: The area destined for the project is in the municipality of Manicoré (-60°57'06.409" W and -6°10'13.997" S), in the state of Amazonas, with river access via the Maturá River. The property has an area of 39,622.83 ha and an area of 7,874.82 ha for the project. The climate is classified as climate (Am) according to Köppen for Brazil. This region has a tropical rainy climate. Characterized by having an annual precipitation that can vary from 2400 to 2800 mm and the average temperature with seasonal variation from 25.0 to 27.0°C, with high average annual temperatures, average relative humidity of the air between 85 and 90% and may reach levels below 50% in periods of drought (Alvares et al., 2013). For more information, please see Appendix VI - GPD Requirements.

PAI# - Lagoa Grande II - Manicoré (AM)

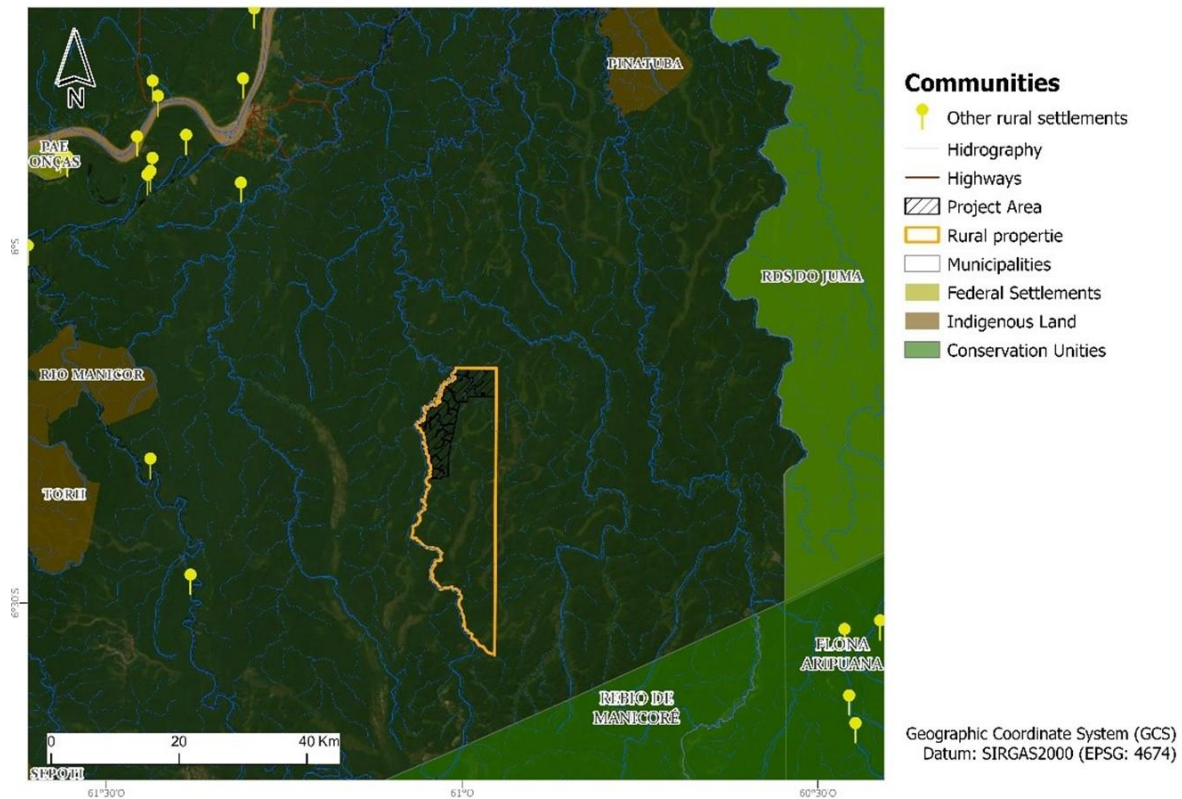
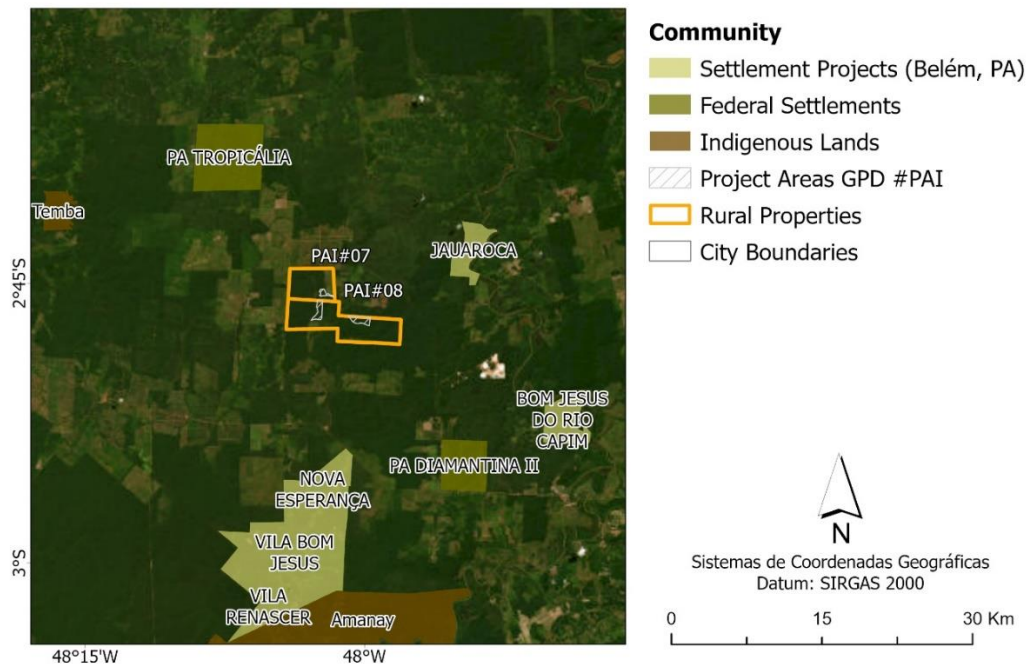


Figure 3. Communities living near the project area (PAI #6).

Regarding PAIs #7-9: The maps bellow illustrates the new project areas and new community will be additional at grouped project APD Brazilian Amazon.

(a) PAI#07 - Nubia Floresta - Ipixuna do Pará (PA), PAI#08 - Floresta 1 - Ipixuna do Pará (PA) e Tomé-Açu (PA)



(b) PAI#09 - Ribeiro Rondon - Rondon do Pará (PA)

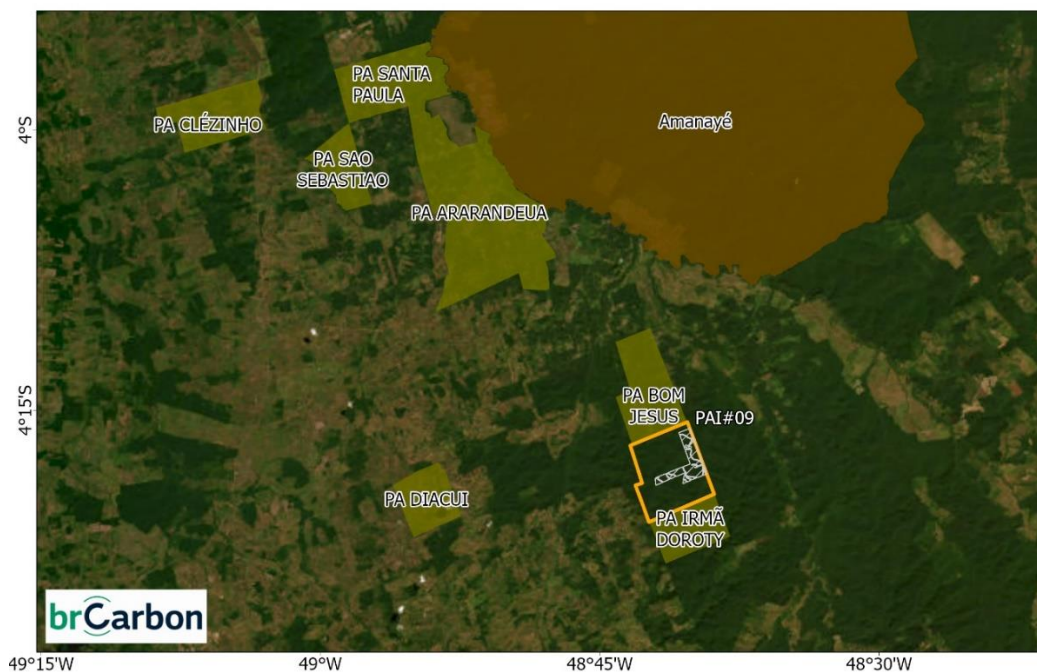


Figure 4. Communities living near the project area (PAIs #7-9).

To more information about the Eligibility Criteria for Grouped Project and the inclusion of new instances (PAIs #6-9) please visit the item 3 of this section above, and the Appendix VI – GPD Requirements.

7) Changes to Management (G4.1)

There was no change in the management structure, roles, or responsibilities of the grouped project due to the inclusion of new instances or new stakeholders, so that it remains the same as per section 2.4.1 of the CCB REDD APD GPD.

2.2.6 Risks to the Project (G1.10)

All natural and human-induced risks to the expected climate, community and biodiversity identified measures needed and implemented to mitigate them are described in the below:

Table 13. Natural and human-induced risks

Identify Risk	PAIs	Potential impact of risk on climate, community and/or biodiversity benefits	Actions needed and designed to mitigate the risk	Actions implemented to mitigate the risk
Unavoidable unplanned deforestation. (Human-induced)	PAIs #1-5	The traditional communities residing in the project area promote deforestation to expand pastures or new plantations. This is most often a reduced magnitude and low impact activities, however, over time, such activities can harm the expected benefits to the climate.	BRC can't stand against this type of activity because it is fundamental for communities' livelihoods. The project will develop rural extension activities, training, and capacity building aimed at agriculture landscape management improvement, with the objective of increasing community productivity, reducing pressure on forests, and incorporating organic carbon into the soil.	BRC carried out 02 training courses on sustainable cattle raising with the communities of Porongaba, Palmares, Potiguar, Novo Destino e Baturité ² (Fig. 01). There was a total of 03 days of field lectures in 02 7farms. 19 people participated. With training in sustainable livestock farming, BRC hopes to improve the productivity of pastures in the project area and reduce pressure on forest remnants.
	PAI #6	Although there are no communities living within the project areas, there are people who exploit non-timber products, which can be vectors of degradation.	BRC will work together with extractives to raise awareness about the carbon project, forest conservation and the eventual valorization of exploited non-timber products.	BRC is carrying out a survey of the actors who carry out these periodic extractivism.

² Novo Destino and Baturité represents communities outside the project area being benefited by the project activities implementation.

	PAIs #7-9	Although there are no communities living within the project areas, there are surrounding it.	The project will develop rural extension activities, awareness about the carbon project and its boundaries, and also training, and capacity building aimed at agriculture landscape management improvement, with the objective of increasing community productivity, reducing pressure on forests.	BRC carried out 04 training courses on sustainable cattle raising with the communities of Settlement projects (Irmã Dorothy, P.A Bom Jesus, P.A Aguiá. P.A Rio das Cruzes and P.A Diamantina)
Wildfires. (Human-induced)	PAIs #1-5	The traditional communities in the project area use fire as an instrument for landscape management. This fire can strike the forest, especially in drier years, and undermine the project's climate benefits.	BRC will work with wildfire prevention and combating wildfires. These actions include training and qualification, training of volunteer fire brigades, purchase of equipment to fight forest fires and continuous fire monitoring from satellite images.	
	PAI #6	Traditional communities use fire as an instrument for landscape management. This fire can strike the forest, especially in drier years, and undermine the project's climate benefits.	The absence of nearby communities and within the project areas reduces the risk of induced fire, however, we will carry out awareness activities, with outside extractives, about the risks and fire management.	
	PAIs #7-9	Traditional communities use fire as an instrument for landscape management. This fire can strike the forest, especially in drier years, and undermine the project's climate benefits.	The absence of communities within the project areas reduces the risk of induced fire, however, we will carry out awareness activities, with the surrounding communities, about the risks and fire management.	BRCarbon is in contact with the National Center for the Prevention and Combat of Forest Fires (Prevfogo) to budget training and environmental education activities for fire management for community groups around the project areas. .

Political (Human-induced)	PAIs #1-5	Specific groups of stakeholders can mobilize against carrying out project activities following their own agendas, which can compromise the project's benefits to communities.	BRC works with a specific social engagement protocol, which comprises a stage aimed at obtaining free, prior, and informed consent and the creation of mechanisms for continuous communication, associated with a grievance and redress procedure.	Social engagement protocols and FPIC conducted in all relevant EIPs. 43 door-to-door visits and 05 public meetings were carried out during the first and second stages of social engagement, respectively.
	PAI #6	Specific groups of stakeholders can mobilize against carrying out project activities following their own agendas, which can compromise the project's benefits to communities.	BRC seeks to carry out the survey and all stakeholders, who may interfere in the success of the carbon project and keep them informed about the objectives and limits of the project.	
	PAIs #7-9	Specific groups of stakeholders can mobilize against carrying out project activities following their own agendas, which can compromise the project's benefits to communities.	BRC seeks to carry out the survey and all stakeholders, who may interfere in the success of the carbon project and keep them informed about the objectives and limits of the project.	BRC understands that these actions are important, and the strengthening of these relationships happens in the long term. Therefore, BRC constantly carries out communication and local articulation activities, such as delivery and dissemination of the project summary, monitoring results and the verification process, which were carried out in meetings with public agents (town halls, unions, communities involved).
Predatory hunting and overfishing. (Human-induced)	PAIs #1-5	Hunting and fishing are cultural and fundamental aspects of the livelihoods of the traditional communities residing in the project area. These activities are assumed to be traditional and of low impacts. On the other hand, these activities are carried out in a disorganized manner, without any kind of monitoring or control, which can harm the project's biodiversity objectives.	BRC will promote fauna monitoring with a focus on game and fish species and environmental education actions, if necessary.	03 fauna monitoring carried out, one in the rainy season and two in the dry season. Monitoring covered all PAIs. These monitoring evaluated game species and constituted the initial diagnosis that will be used as a baseline for future comparisons.

	PAI #6	Hunting and fishing are cultural and fundamental aspects of the livelihoods of the traditional communities residing in the project area. These activities are assumed as traditional and of low impacts. On the other hand, these activities are carried out in a disorganized manner, without any kind of monitoring or control, which can harm the project's biodiversity objectives.	BRC will promote fauna monitoring with a focus on game and fish species and environmental education actions, if necessary.	One fauna monitoring was carried out (rainy season) and one in the dry season will be implemented. These monitoring evaluated game species and constituted the initial diagnosis that will be used as a baseline for future comparisons.
	PAIs #7-9	Hunting and fishing are cultural and fundamental aspects of the livelihoods of the traditional communities residing in the project area. These activities are assumed as traditional and of low impacts. On the other hand, these activities are carried out in a disorganized manner, without any kind of monitoring or control, which can harm the project's biodiversity objectives.	BRC will promote fauna monitoring with a focus on game and fish species and environmental education actions, if necessary.	One fauna monitoring was carried out (dry season) and one in the wet season will be implemented. These monitoring evaluated game species and constituted the initial diagnosis that will be used as a baseline for future comparisons.
Extreme droughts (Natural)	PAIs #1-5	Climatic anomalies such as El-Nino could change the air currents over the Amazon biome, making the forest drier and more flammable, which could compromise the project's climate and biodiversity objectives.	BRC will increase the budget and intensity of activities related to forest fire prevention and wildfire combat in El-nino years.	BRC developed a fire alert monitoring system, based on which helps us control actions in relation to forest fires. Fire monitoring is found in Appendix V ("Monitoring_2_2022").
	PAI #6	Climatic anomalies such as El-Nino could change the air currents over the Amazon biome, making the forest drier and more flammable, which could compromise the project's climate and biodiversity objectives.	BRC will increase the budget and intensity of forest fire prevention and wildfire combat activities in El-nino years.	We developed a fire alert monitoring system, based on which helps us control actions in relation to forest fires. Fire monitoring is found in Appendix V ("Monitoring 2 2022").
	PAIs #7-9	Climatic anomalies such as El-Nino could change the air currents over the Amazon biome, making the forest drier and more flammable, which could compromise the project's climate and biodiversity objectives.	BRC will increase the budget and intensity of forest fire prevention and wildfire combat activities in El-Niño years.	We developed a fire alert monitoring system, based on which helps us control actions in relation to forest fires. Fire monitoring is found in Appendix V ("Monitoring 2 2022").

2.2.7 Benefit Permanence (G1.11)

For all project activity instances, already verified or under verification process, BRC took legal steps to ensure that the climate, community, and biodiversity benefits will be maintained beyond the project lifetime. Each PAI has a legal agreement (Appendix I – Legal Agreements) that was signed with the landowner to continue the management practices that will lead to the project area conservation for at least 30 years and guarantee the permanence of the carbon stocks in the post project scenario and, as well, the community and biodiversity benefits:

4.2 Landowner responsibilities: “(ii) Ensure, through legal instruments for conservation (Environmental Servitude, Private Natural Heritage Reserve – RPPN's, among others), the maintenance of areas and the legal protection necessary to ensure the permanence of carbon stocks in the post-project scenario. In other words, to maintain the integrity of the area object of the Carbon Credit Project, where no land use change of the rural property is allowed”.

The GPD GHG accounting period is 100 years. Any PAI lifetime can be extended until the year 2121.

2.3 Stakeholder Engagement

Interaction with stakeholders was conducted in four distinct phases.

The first phase involved socioeconomic and cultural surveys and diagnoses. In this first phase, BRC team shared with the communities and other stakeholders a project design that included general and specific types of activities that could be developed under the project to support discussions among community representatives and prepare for the second round of interaction. BRC team also discussed with the communities the potential benefits, costs, and risks of the project. This phase is fundamental to map and identify the local stakeholders, mainly the people who lives in the impacted area of the project, in this sense is collected all the information displayed to our team, even some evidence about the existence of any person who can be directly affected by the project.

The second phase took the form of participatory workshops to design the project activities and focused on building and obtaining the free, prior, and informed consent of the communities affected by the project. In these workshops, BRC defined the project's social activities, monitoring parameters, and mechanisms for participation and benefit sharing. BRC also considered potential negative impacts and possible mitigation measures, and established mechanisms for ongoing communication and grievance procedures. In these workshops, BRC team discussed topics such as HCVs and created an exclusive space for women to interact.

In the third phase, was conducted social monitoring based on the previously established monitoring plan. In the fourth phase, PP established the dissemination of monitoring results, the procedure for

participating in the CCB public comment period, the project validation/verification process, and the role of the auditor.

2.3.1 Stakeholder Access to Project Documents (G3.1)

All project documentation, including the project description and monitoring reports, will be made available through the BRC and Verra websites, social media, and during public meetings. The printed version distributed to communities and stakeholders will include a general description of physical and social parameters and other relevant aspects during the project lifetime.

2.3.2 Dissemination of Summary Project Documents (G3.1)

A printed version of the CCB GPD summary in Portuguese was actively distributed to all stakeholders prior to the scheduled future meetings, and copies were also available during the public meetings for anyone interested in the project.

2.3.3 Informational Meetings with Stakeholders (G3.1)

The BRC team has been visiting the territory and the interested parties during the whole project period, has promoted public meetings in Sena Madureira (where is placed the initial instances) and in the project areas on an annual basis to disseminate the results and assess the costs, risks, and benefits of the project. But, not just there, the BRC is doing the same activities with the stakeholders of the new instances in Pará and Amazonas, as well.



Figure 5. Public meetings and participatory workshop to survey demands for project activities (PAI#2-5), March 2022.



Figure 6. Public meetings to present the project and participatory workshop to survey demands for project activities (PAI #6), September 2022

The verification process has been conducted promptly to ensure that all stakeholders were well-informed about the developments. Since the beginning of 2022 the BRC team has engaged with every community along the Iaco River and visited public institutions to discuss the project details.

The BRC has as ordinary practice to organize and schedule meetings with community members beforehand to try to make possible the participation of most of them, creating the opportunity to all local people to participate and get access to the proper information about the project issues. To assure that, the project's local coordinators make contact with local leaderships through phone calls, WhatsApp contacts and the spread on the territory of inviting posters. However, because of the lack or fallibility of the communications systems in some of our project areas, it is necessary to go on the ground to invite them to participate in meetings and other activities.

Informational meetings with other stakeholders such as public institutions are made by official channels, and, sometimes, when necessary, through direct contact with public servants. The table below show all the informational meetings:

Table 14. Informational Meetings with stakeholders

Instance	Date	Informational Meetings
PAIs #2-5	March 25th 2022	Public meeting with Porongaba riverside community – discussion about the local demands, praises, complaints and other issues.
PAIs #2-5	March 27th 2022	Public meeting with Porongaba center community – discussion about the local demands, praises, complaints and other issues.
PAIs #2-5	March 28th 2022	Public meeting with Seringal Palmares community – discussion about the local demands, praises, complaints and other issues.
PAIs #2-5	March 03rd 2022	Public meeting with Seringal Katianã community – discussion about the local demands, praises, complaints and other issues.
PAIs #2-5	April 30rd 2022	Public meeting with Seringal Palmares community – discussion about the local demands, praises, complaints and other issues.
PAIs #2-5	March 27 th to April 03 rd 2022	Public reunions with Acre public agencies – State Secretary of Education, Culture and Sports; State Health Secretary; Institute of Climate Change and Regulation of Environmental Services of the State of Acre.
PAIs #7-9	May 3 rd 2022	Visit in the Environmental Municipal Secretary of Paragominas (SEMMA – Secretaria Municipal de Meio Ambiente). Meeting between BRC staff and Mr. Roberto Carlos Gambin (Environmental Municipal Secretary of Paragominas);
PAIs #7-9	May 3 rd 2022	Visit to the State Regional Centre of Environmental Regularization of Paragominas (Núcleo Regional de Regularidade Ambiental de Paragominas). State Regional Centre attends the Capim River basin Meeting between BRC staff and Ms. Luana Alves (coordinator) and Ms. Luana (analyst).
PAIs #7-9	May 3 rd 2022	Visit to the Social Assistance Municipality Secretary (SEMAS – Secretaria Municipal de Assistência Social de Paragominas). Meeting with Ms. Amanda Alves Oliveira Purger (Social Assistance Municipal Secretary);
PAIs #7-9	May 3 rd 2022	Visit to the Environmental, Science, and Technology Municipal Secretary (Secretaria Municipal de Meio Ambiente, Ciência e Tecnologia de Ipixuna do Pará). Meeting between BRC staff and Luanda Thalita de Brito Silva (Environmental Municipal Secretary);
PAIs #7-9	May 04th 2022	Visit to the Vale do Acará Agricultural Association of Tomé-Açu (AAVA - Associação Agropecuária do Vale do Acará). Meeting between BRC staff, Bruno Machado (owner of instances PAI# 7 and 8), Mr. Manoel Antônio de Lima (Association President), Mr. João Cláudio de Lima Nivaldo (fiscal council director) and Mr. Ataíde de Moura (fiscal council director);
PAIs #7-9	May 04th 2022	Visit to the Environmental Municipal Secretary of Tomé-Açu (Secretaria Municipal de Meio Ambiente de Tomé-Açu). Meeting between BRC staff, Bruno Machado (owner of instances PAI#7

Instance	Date	Informational Meetings
		and PAI#8) and Mr. Cosmo Ferreira do Amaral (Environmental Municipal Secretary).
PAIs #7-9	May 05th 2022	Visit to the State Agency of Agricultural Defense of Dom Eliseu (ADEPARA - Agência Estadual de Defesa Agropecuária do Pará). Meeting between BRC staff and Mr. Gersilon Silva da Gama (Mayor of Dom Eliseu), Mr. Maikon Mantelli (Environmental Secretary of Dom Eliseu), Ms. Mônica Cristina Peloso Aguiar (Economic Development, Mining, Industry Commercial and Tourism Municipal Secretary of Dom Eliseu), Mr. Genilson Freitas Cavalcanti (Economic Secretary of Dom Eliseu) and members of the Dom Eliseu Rural Workers Syndicate, Mr. Tarcizio Burin (President), Ms. Laura Priore (Vice-President) and Mr. Guilherme Araújo.
PAIs #7-9	May 05th 2022	Meeting with Rondon do Pará Rural Workers Syndicate (Sindicato de Trabalhadores Rurais de Rondon do Pará). Meeting with Mr. João Malcher (president), Ms. Cristina de Barros Malcher, and the lawyer Ms. Maria Eduarda de Barros Malcher.
PAIs #7-9	June 4th and 8th 2022	Project presentation and conducting interviews for the socioeconomic surveys of the Bom Jesus Settlement Project community.
PAIs #7-9	June 5th 2022	Project presentation and conducting interviews for the socioeconomic surveys of the Irmã Dorothy Settlement Project community.
PAIs #7-9	June 8th and 9th 2022	Project presentation and conducting interviews for the socioeconomic surveys of the Águia Settlement Project, in Rio Bonito and Rio Azul communities.
PAIs #7-9	June 10th 2022	Project presentation and conducting interviews for the socioeconomic surveys of the Rio das Cruzes Settlement Project community.
PAIs #7-9	June 10th and 12th 2022	Project presentation and conducting interviews for the socioeconomic surveys of the Vila Brasil Settlement Project community.
PAIs #7-9	June 11th and 13th 2022	Project presentation and conducting interviews for the socioeconomic surveys of the Dimantina II Settlement Project community.
PAIs #7-9	June 15th 2022	Project presentation and conducting interviews for the socioeconomic surveys of the Barreirinha Indigenous Land.
PAI #6	September 12th to 14th 2022	Field visit, identification, mapping, and social diagnosis of the communities living in the project zone in Manicoré/AM, involving Indigenous Land of Pinatuba, and the Biriba community, beyond isolated families on the Matauará river's bench. Discussions with local communities to present the project area and the project objectives. This initial stage of identifying communities potentially affected by project activities and presenting the project is part of a broader process of free prior and informed consent, which continued in subsequent months.
PAI #6	March, 1st 2023	As part of stakeholder identification process, the social team conducted a meeting at the Santa Luzia Municipal Elementary School in the Curara's community with the participation of 24

Instance	Date	Informational Meetings
		peoples. The project was presented, doubts were clarified, and a preliminary survey of community demand was conducted. Additionally, a socioeconomic questionnaire was administered to community leaders to better understand the territory's reality and assess possibilities for future activities.

2.3.4 Community Costs, Risks, and Benefits (G3.2)

Analyzing the costs, risks, and benefits of any project with community demands a lot of dialogue between the BRC team and the community members, sometimes it is not easy to understand all of them. But, of course, some benefits and costs are clearer than the risks.

It is easier to measure costs in the short, medium or long term, as it is to measure benefits such as improvement on health or education quality, but the risks usually turn clear after the implementation of the first project's steps. Therefore, it is during the implementation of the project itself that the compression of the risks is possible, and by this and the community demands that project can improve its ways of shrinking risks and mitigating the noninterest impacts.

Regarding PAI #6

The BRC team has conducted social engagement, surveys, and socioeconomic and cultural diagnostics. During these processes, communities have the opportunity to discuss the benefits, costs, and risks of the project from their perspective.

Activities were developed with the participation of local communities, allowing for a flexible and dynamic process that can be updated whenever communities present new needs.

All project activities costs are covered by BRC. Our strategy is to promote forest conservation based on financial flows from the carbon market, so that communities and families do not bear any financial risk or cost, nor are they forced to change their way of life. The forest conservation project will not affect the livelihood of local people. The project can contribute with net benefits by implementing the proposed activities as requested by the communities.

Regarding PAIs #7-9

Project benefits are expressed in the form of the project activities which were elaborated with residents from the communities directed influenced by the farms where the project activities start to be implemented. The initial activities in the first project year are based on information collected during the second stage of BRC social engagement protocol.

All the project activity costs are the responsibility of the project proponent. BRC has on its core business, the strategy to promote the forest conservation based in the financial flows from the carbon market, so the communities and families do not assume any financial risk or expenses, neither any compulsory change in its way of life. It is worth noting that the 3 instances of the PA regional (PAIs #7-9), do not have communities living inside the project area, just in the surroundings.

BRC does not expect the project to bring risks to the identified stakeholders, to its resources or to its ownership rights. On the contrary, the project was designed to promote positive net impacts to communities, in compliance with the CCB requirements. Risks, however, were discussed with the stakeholders identified during the first stakeholder consultation stage, due to the doubts and fears expressed by the communities during the interviews.

The project would not imply expropriation or involuntary relocation, it is necessary to highlight that all the instances of PAIs #7-9 are private areas, with no communities which lives inside it. Further than that, was informed to communities on project zone that forest management operations, although possible within the project scope, were not planned for the PAIs #7-9 in the short term, and that the project activity would not propose zero deforestation commitments to communities.

BRC understands that both, the landowner, and the communities in the surrounding have specific rights that must be respected and that can be exercised in harmony, which was attested to the communities during the stakeholder engagement process as a measure to mitigate the risks perceived by the communities.

In addition, BRC understands that the communities' livelihoods depend on the deforestation of small patches for agriculture or pasture and that the project should not interfere in this local dynamic, which was also attested to communities as a mitigation measure. In this way, through the stakeholder consultation process and BRC social engagement protocols, the existing risks in the perception of communities are mitigated.

2.3.5 Information to Stakeholder on Verification Process (G3.3)

The BRC team went to the field in the first quarter of 2023 to continue activities with communities and inform them about the audit process that will take place over the coming months (April 2023). The communication was done through workshops in visits to the territory, through official information (protocols) and by personal information via WhatsApp (Appendix VII - Communities).

Regarding PAI #6

Our communication takes place through several means, including face-to-face and online meetings, social media, WhatsApp messages, seminars, schematic drawings, didactic videos, and printed materials.

The goal of the communication is to present the project in a simple and didactic way and answer any related questions. During the meetings, we have previously informed all stakeholders about the periodic verification procedures. Once the verification schedule is set, we communicate with communities and stakeholders.

At this time, all stakeholders contacted have been informed of the audit process as part of the validation and verification process.

Regarding PAIs #7-9

Our communication takes place through various means, including face-to-face and online meetings, communication through social media, WhatsApp messages, oral seminars, schematic drawings, didactic videos, and printed materials. The aim of the communication is to present the project in a simple and didactic way and to answer all related questions. During the meetings, we have previously informed all stakeholders about the periodic verification procedures. Once the verification schedule is set, we communicate with communities and stakeholders.

In February 2023 the BRC staff team visited and informed the main project stakeholders about the validation process and to provide a copy of the project description summary.



Figure 7. Informational meeting to verification process.

2.3.6 Site Visit Information and Opportunities to Communicate with Auditor (G3.3)

For all project activity instances, already verified or under verification process, communities were informed during the public meetings held on social engagement. BRC is responsible for the logistics and displacement necessary for the smooth running of the audit, allowing the VVB to have access to community representatives at its own discretion. Communication between auditor and communities will be facilitated by the accompaniment of an independent third party to the process, if demanded by the VVB.

During interviews with community members, it is PP practice to let auditors free to talk privately with any member of the community. This practice is also informed to the community members before the auditors' visit, so that they feel free to express their impressions about the project, without any embarrassment.

2.3.7 Stakeholder Consultation (G3.4)

For all project activity instances, already validated or under validation process, the stakeholder consultation process took place during the participatory workshops for the design of the project activities, developed during the second stage of social engagement, that happens after the free, prior and informed consent (FPIC).

In these events, communities are invited and stimulated to speak freely about their problems and concerns, taking into perspective how the project could help.



Figure 8. Public meeting - Stakeholder consultation process in PAI #4.

Thus, at the end of each event, a list of possible project activities was created. This list was considered by BRC based on the available budget and the activities chosen were prioritized to generate an execution

The image shows a large blackboard in a classroom, decorated with a Brazilian flag and a "ATENÇÃO" sign. The blackboard has "Sejam Bem vindos" and "1ª Reunião pública de 2022" written on it. Various sticky notes and posters are attached to the board, including a "SAÚDE" note with a list of topics like "Atividade de observação", "Atividade de observação", and "Atividade de observação". There are also posters for "SOMNOS" and "ATENÇÃO".

For other stakeholders, such as public government (municipality and state) the consultations are based on communication by e-mail, official letters and in specific scheduled meetings, all evidence is registered in the project database.

Stakeholder consultation involving communities will take place during participatory project design workshops, which will be developed during the second stage of social engagement. During these events, communities are invited to speak freely about their problems and concerns, considering how the project can help. Thus, at the end of each event, a list of possible project activities is created. This list will be considered by BRC based on the available budget and the selected activities will be prioritized to create an execution plan.



Figure 10. Community consultations in PAI #6.

Public authority and civil society institutions that are or should be in some way related to the communities surrounding the project were consulted. During the field visits, the social team identified that only the Secretariat of Indigenous Health - SESAI is active in the area, although the area is still being studied for conversion to Indigenous Land. However, based on the dialogs and the identified potential for sustainable extractivism, other actors active in the community that can implement public policies to strengthen this chain were reviewed, as well as civil society actors.

Consultations with other stakeholders, such as the public government (municipality and state) are based on communication by e-mail, official letters, and in specific scheduled meetings, that are registered in the project database.

Regarding PAIs #7-9

The stakeholder consultation process took place during the participatory workshops for the design of the project, developed during the second stage of social engagement. In these events, communities were invited to speak freely about their problems and concerns, having in perspective how the project could help. Thus, at the end of each event, a list of possible project activities was created. This list was considered by BRC based on the available budget and the activities chosen were prioritized to generate an execution schedule. The project activities, as they are described today, reflect the demands of the communities within the project area, considering the PAIs #7-9.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

For all project activity instances, already verified or under verification process, the GPD continued communication and consultation plan is based on digital inclusion, annual public meetings and informal visits and conversations.

BRC provided means of communication such as face-to-face (presential), internet and telephone, which enable effective and continuous communication with isolated communities through video calls and messages. This mechanism also allows for consultations to be carried out during the time there are no visits to the territory.

Annual public meetings have taken place to report the results of participatory monitoring on the implementation of project activities. During these events, communities have new chances to influence the project design and its implementation during the subsequent monitoring period, aligning with adaptive management.

2.3.9 Stakeholder Consultation Channels (G3.5)

For all project activity instances, already verified or under verification process, the social engagement protocol developed by BRC ensured that all consultations and participatory processes were undertaken directly with communities and other stakeholders. Notwithstanding it's worth noting, that for many reasons there are different stages in the relationship between BRC and the territories and its communities of each instance, it means that in some instances these consultation channels are more advanced than others. The main reason for this is the lifetime of each instance, in addition to the particularities of each community group.

The direct consultation and involvement of communities in participatory processes so far, can be evidenced in this document by photographic records (at Section: 2.3.7).

2.3.10 Stakeholder Participation in Decision-Making and Implementation (G3.6)

For all project activity instances, already verified or under verification process, stakeholder participation in decision-making was ensured by the BRC social engagement protocol, which provided, in its second stage, the execution of participatory workshops for the design of the project. During these workshops, an exclusive space was reserved for the participation of women, free from the influence of men, to take care of gender aspects. And, more than that, to assure the properly participation of women in all meetings, the BRC social engagement protocol predicts a team to stay with the kids to let the women free to be part of the decision-making process. BRC is formed by multidisciplinary professionals, some with more than 15 years of experience in developing carbon projects, which gives them the necessary skills to conduct public meetings with appropriate language. A comic book was produced and distributed to the communities to

help them a better understanding of the nature and scope of the carbon project, among other relevant aspects. The effectiveness of the participation mechanisms implemented so far can be evidenced by the description of the project activities, which reflect the demands presented by the community (Appendix VII - Communities).

Regarding PAI #6

As the activities of the project are still being implemented, at this moment there are no activities that can describe the effective and appropriate participation of the communities. However, in the first stages of stakeholder consultation and site visits, the local BRCarbon team has been careful to map municipal institutions and other stakeholders to promote the project to all residents along the Matuará River.



Figure 11. Application of the socioeconomic questionnaire with leadership at Curara village.

In the next stages of the stakeholder consultation, BRC will conduct participatory activities and workshops with the local community to discuss the implementation of activities according to the needs identified in the socio-economic diagnoses. On this occasion, the approach foresees a specific moment to listen to specific demands of women.

Regarding PAIs #7-9

We enable effective participation of all communities through the BRC Social Engagement Protocol. The protocol includes participatory workshops that allow communities to participate in decision-making during project design. During these workshops, we reserve an entire space for women's participation (excluding men). BRC has a team with more than fifteen years of experience in carbon project development, which gives us the necessary skills to conduct public meetings with appropriate language. Further than

that, we created and distributed an illustrated book to help them understand the nature and scope of the carbon project, as well as other important aspects.

So far, BRC has demonstrated the effectiveness of the participation mechanisms by describing project activities that reflect the demands made by the community.

The figure below shows the local coordinator together with BRC's social team on activities at Barreirinha Indigenous Land.



Figure 12. Local coordinator and BRC social team at Barreirinha Indigenous Land.

2.3.11 Anti-Discrimination Assurance (G3.7)

The BRC directors are not involved in any form of corruption, which is enforceable by the company's social statute (Appendix VIII – Social Statute) and by BRCarbon's Ethics and Conduct Code (Appendix IX - BRC's code of ethics). Any kind of involvement, direct or indirectly, in bribery, embezzlement, fraud, favoritism, cronyism, nepotism, extortion, and collusion are discouraged and disliked by Conduct Code and are punishable by expulsion or other measurements.

BRC's code of ethics states that all employees, directors, and company partners must comply with all relevant laws related to anti-discrimination assurance. The landowner as well have signed a conservation agreement (Appendix I – Legal Agreements) that clearly states that both parts must follow all the applicable laws, regarding project implementation and management and their commitment with no forms of discrimination, including discrimination based on gender, race, religion, sexual orientation, or other habits.

2.3.12 Grievances (G3.8)

At BRC, we recognize that people's engagement, needs and well-being are critical to sustaining the project over the long term. Therefore, we maintain direct communication with stakeholders and the community through calls and messages so that communication, feedback, and complaints are always possible. Each year, the BRC team holds at least one meeting with all communities. At these meetings, we gather input on the activities that have already been implemented and requests to maintain or implement new activities.

In these meetings, the team seeks, in the future, to use questionnaires to objectively measure the effectiveness of activities. The basis of this type of questionnaire is being developed by the social sector of the BRC with the aim of bringing in an organized way the feedback given by the community, and then adapting our activities based on their analysis.

So far, the BRC strategy to capture the grievances is through these public meetings, taking notes of complaints and suggestions during the gathering, and through informal conversations between our team and the communitarians.

The process for receiving, hearing, responding to and resolving complaints is defined and described in three stages:

Amicable negotiation: we listen to and analyze complaints from communities and other relevant stakeholders and provide an oral or written response within one week via e-mail and/or WhatsApp, or through face-to-face meetings.

Mediation by a neutral party: if BRC team cannot resolve a complaint amicably through clarification or redress, the dispute is referred to an independent third party for mediation. This third party may vary depending on the nature of the dispute. If the dispute is a land dispute, we may refer the matter to the state or federal land agency. If the dispute is between communities, it may be mediated by the BRC or community association representatives.

Arbitration: if the third party is unable to mediate the ongoing dispute, the ongoing dispute will be assessed in the District of Piracicaba or in the local district.

To make this process possible the BRC is structuring its ombudsman system to be the main channel of complaints for all the stakeholders.

2.3.13 Worker Training (G3.9)

Regarding PAIs #1-5

For all project activity instances, already verified or under verification process, in order to provide orientation and training for the project's workers and community, BRC provided in the grouped project, different activities, such as: formation of the local team to support forest inventory; Technical Assistance and Rural Extension (ATER) related to sustainable livestock; Environmental education related to carbon cycle, climate change, the importance of forests and their different ecological functions; Safety in forest management operations; Woman's Health; volunteers environment agents training, Brazilian Micro and Small Business Support Service (SEBRAE) lecture. Beyond that, some actions in PAIs #2-5 are worth mentioning, such as accessing the internet, enabling young people to access online courses and training.

Regarding PAI #6

No training activities have yet been conducted with the communities surrounding the project area (there is no community within the area of PAI #6). However, some of these activities are already planned and included in the planning of the social activities of GPD for this case. These activities were determined after analyzing the existence and potential of some value chains in the area. Which are: Sustainable practices for the collection and storage of Brazil nuts; Entrepreneurship and commercialization of sustainable wild crops, mainly Brazil nuts. Entrepreneurship with a focus on handicrafts.

Regarding PAIs #7-9

Despite the PD proposition of hiring local people to some project activities, because of initial stage of the project implementation around these instances, in this monitoring period no one was hired around it, thus no training has been done so far at these project instances.

2.3.14 Community Employment Opportunities (G3.10)

Excepting in the region of the PAIs #7-9, for all of others project activity instances, already verified or under verification process, during the monitoring period, BRC hired community representatives such as forest workers, boatmen, carpenters, and cooks.

The selective process was done in a transparent way, disseminating the vacancy to all the communities' members by a radio ad and during public meetings. The selection was done based in the abilities and knowledge according to each activity demand and prioritizing women and vulnerable and/or marginalized people.

A potential list of community members that could support in the implementation and management of the project activities was elaborated. This database is part of the BRC strategy to implement a rotative system of hiring, giving opportunities to a higher number of the communities members.

BRC also hired specialized service providers to carry out forest inventories, soil analysis and biodiversity monitoring.

2.3.15 Relevant Laws and Regulations Related to Worker's Rights (G3.11)

For all project activity instances, already verified or under verification process, the Project proponent is committed to meet all applicable Brazilian laws and regulations applicable to worker rights, Furthermore, have informed all workers about their rights, before hiring as its described in the Brazilians Labors Laws.

The following is a list of Brazil's relevant laws and regulations applicable to worker's rights:

The Brazilian Constitution, Chapter II-Social Rights, Articles 7- 11 which addressed: I) Minimum wage, ii) Normal working hours, iii) Guidance on vacation and weekly leave iv) Guidance on maternity and paternity leave v) Recognition of collective bargaining vi) Prohibition of discrimination³. In addition to the Constitution, there are two additional decrees related to Brazilian labor laws.

Labor Federal Law (Consolidate of Working Laws ("CLT")): Decree-Law N. ° 5.452, of May 1st of 1943. This decree gives more clarification on the subjects: i) Hourly, daily, weekly, and monthly work hours, ii) Employment of minors and women, iii) Establishes a minimum wage, iv) Worker safety and safe working environments, v) Defines penalties for employer's non-compliance, vi) Establishes a judicial work-related process for addressing all worker related issues. FEDERAL LAW N° 5.889, June 8th of 1973 (Establishes Regular Norms for Rural Workers). This is a complementary law to the 1943 decree, once prior to 1973, rural workers did not have the same rights as urban workers. In 1973, this law was established to specify the equality between urban and rural workers, along with compensation for overtime.

Complementary Law 123/2006 of December 14th, 2006. Establishes the National Statute of Microenterprise and Small Business; change devices of the Laws in 8,212 and 8,213, both dated July 24th, 1991, of the Consolidation of Labor Laws - CLT, approved by Decree-Law no. 5,452 of 1st of May 1943, of Law no. 10189, of February 14th of 2001, of the Complementary Law in the 63, of January 11, 1990; and revokes the Laws in the 9,317 of the 5th of December 1996, and 9841 of October 5, 1999. Art. 3 For the purposes of this Complementary Law, are considered micro-enterprises or companies small business company, simple society, the individual company of limited liability and the entrepreneur who refers to art.

³ Massachusetts Institute of Technology, "Brazilian Constitution," Available: <http://web.mit.edu/12.000/www/m2006/teams/willr3/const.htm>

966 of the Law in 10,406 of the 10th of January 2002 (Civil Code), duly registered in the Registry of Merchant Companies or in the Civil Registry of Legal Entities.

2.3.16 Occupational Safety Assessment (G3.12)

For all project activity instances, already verified or under verification process, the risk analysis to the workers safety was based in the proposed jobs opportunity. Each employment opportunity has a unique assessment to reflect the particularities of the job. During the execution of the project, a series of measures and actions aimed at the health and safety of the worker is necessary. It is also necessary to understand the risk involved in the activities carried out. On its context, during the job, diary activities will be proposed, such the Safety, Environment and Health Diary Dialogue (DDSMS), that will be promoted to inform workers about their rights and about their obligations as individual and as a team.

Training on disease and accident prevention is planned for workers linked to the project, along with clarifications and general education and conduct actions that minimize accidents and harm to workers' health. Appropriate care for emergency situations will be proposed, with the establishment of local resources for health care and removal of victims in any accidents.

Actions aimed at minimizing the risk to workers' health will involve the promotion of adequate conditions to preserve the health and safety of all workers.

The risk analysis to the workers safety, that could be impacted due to the project activities, was based in the proposed jobs opportunity that occurred in the first monitoring period of the PAIs #7-9.

Each employment opportunity will have a unique assessment to reflect the particularities of the job. The use of Personal Protective Equipment (PPE) to be used by different professionals will be widely encouraged and doubts about this aspect will be resolved whenever they occur.

- Field guide (*mateiros*): The project proponent promoted the use of individual protection equipment (boots, helmet, leggings, glasses and gloves) necessary to the field activities.
- Boat pilot (*voadeiras* and/or *rabetas*): The project proponent promoted the use of life jackets in the boats for all project staff and collaborators, including the pilot.
- Accommodation services: No risk was identified.
- Mason services: The project proponent promoted the use of the individual protection equipment (boots, helmet, gloves, etc.) necessary to the mason activities.
- Cooking/kitchen services: No risk was identified.
- Project proponent focal point: The project proponent promoted the use of the individual protection equipment (boots, helmet, leggings, glasses, and gloves) in the field works, according to each activity characteristics.

- Forest inventory team: The project proponent promoted the use of the individual protection equipment (boots, helmet, leggings, glasses, and gloves) necessary to this kind of field.

2.4 Management Capacity

2.4.1 Required Technical Skills (G4.2)

The BRC staff team has more than fifteen years of experience in AFOLU carbon project, including methodological tools, the community engagement, biodiversity assessment, carbon measurement and monitoring, besides PD and MR elaboration.

The skills necessary to implement the project are related to GIS, spatial modeling, forest inventory, biomass inventory, social engagement, sustainable development projects implementation, biodiversity surveys and assessment, land use change monitoring, biodiversity monitoring, social aspects monitoring.

The BRC team is described below:

MSc. Bruna P. Azevedo: Bachelor in Biological Science and master's in science at the University of São Paulo (USP), with an emphasis in Forest Resources and Conservation of Natural Ecosystems. She has expertise in the manipulation and analysis of ecological data, and experience in planning, developing, and executing biodiversity monitoring and conservation projects.

MSc. Eng. Bruno M. Matta: Environmental Engineer, Master in Biodiversity Conservation and Sustainable Development by the School of Environmental Conservation and Sustainability (ESCAS/IPÊ), with research related to the development of a deforestation baseline using the VM0015 methodology. He has experience in valuing Environmental Services and using tools and mechanisms to support environmental management and planning. He has strong expertise in Geoprocessing, Remote Sensing and Geographic Information Systems, experience in the development, validation, and verification of AFOLU projects. He has extensive knowledge of the certification process, especially for forest carbon standards (VCS and CCBS). He has already worked in different Brazilian biomes: Amazon, Caatinga, Cerrado and Atlantic Forest, in public, private and third sector institutions, always on issues related to environmental services, with an emphasis on forest carbon.

PhD, Danilo Roberti Alves de Almeida: Forestry Engineer, researcher, with more than 55 pre-review papers in forest management, conservation, and restoration. Specialist in the use of remote sensing for forest monitoring. Academic background: post-doctoral at University of São Paulo (Brazil), University of Florida (USA), and Bangor University (UK). PhD in Forest Resources, University of São Paulo; master's degree in Tropical Forest, National Institute of Amazonian Research; Bachelor in Forest Engineer, Federal University of Viçosa.

Eng. David Escaquete: Forestry Engineer graduated from the State University of São Paulo (UNESP). David has 19 years of experience working in the forestry sector. He has technical expertise in the areas of strategic planning, business management, forest management, certification, production chains, monitoring and analysis of social and environmental impact, among others. David is CEO of BRFlor, commercial director of Genome A - Bio Tech, product development and certification strategy manager at Go Health Foods - GHF and member of the FSC Ecosystem Services standards and certification committees. Over nearly two decades of work, he has coordinated projects, led initiatives and provided services to a number of governments, universities, civil society organizations, traditional Amazon communities and companies such as the State Governments of Acre, Pará and Mato Grosso, ESALQ/USP, UNEMAT, IMAFLORA, WWF, IFT, GIZ, GITEC, IPAM, USAID, the Paiter-Surui (indigenous from the Sete de Setembro Indigenous Land/RO), Coomflona (extractive from the Tapajós/PA Flona), Alto Trombetas (quilombolas of PA), CONSPRA (Extractivists of Resex Verde par Semper/PA), Cooperfloresta (rubbers of the Chico Mendes Settlement/AC, Amazonbai (Ribeirinhos of the Archipelago do Bailique/AP), Asproc (Ribeirinhos of Medio Juruá/AM), Suzano, Bluetimber, Samise, Agrocortex, Mil Madeiras, Cemal, Pataua, Klabin, Veracel, CMPC Melhoramentos and Arauco.

MSc. Eng. Diego C. Serrano: Forestry Engineer graduated from the Superior School of Agriculture "Luiz de Queiroz" - ESALQ / USP (2003). Master in Energy Systems Planning in forest residues and solid biofuels from UNICAMP (2007). His skills include coordination, preparation and auditing of PDD's/PD's in scopes 1, 4, 13 and 14. He was technical coordinator of the European Union program for strengthening the productive chain of rural cooperatives in Mozambique (2005). He acted as a consultant on Extractive Reserves in the Amazon under UNDP programs (2004). He was a guest researcher at the National Biofuels Pole (2006). In the private sector, he served as technical coordinator of carbon, biodiversity and forest projects for Ecológica Assessoria (2007) and as technical manager of the carbon, forest and biofuels programs for CantorCO2e, where he was technically responsible for more than seventy carbon projects under the CDM and voluntary markets, including eight LULUCF PDs (2008-2009). From 2009 to 2014 he worked as lead auditor by Bureau Veritas Certification (BVQI) on carbon projects (CDM, VCS and emission inventories) where he audited more than sixty projects, 44 of them CDM. He has a lead auditor training in ISO 14001: 2004. In 2009 he founded C3-Forest, Environment & Energy, a company that provides consultancy in carbon, forest (LULUCF and AFOLU) and solid biofuel projects. From 2014 to 2019 Diego also audited VCS AFOLU projects by IMAFLORA and Earthood.

Eng. Gabriela Aguiar: Forestry Engineer graduated from the Superior School of Agriculture "Luiz de Queiroz" (ESALQ/USP), works in communication and stakeholder experience. She has experience in the areas of projects, quality, customer relations, human resources, environment and environmental education. In recent years, she has experienced the sustainability area through socio-environmental communication and the articulation of impact strategies.

MSc. Eng. Heberton Barros: Bachelor's degree in forestry engineering from the Federal University of Espírito Santo (UFES) and master's degree in Tropical Forest Sciences by the National Institute of Amazonian Research (INPA) with an emphasis on Human Support Capacity in Amazon Agro-ecosystems. Since 2009 he has been working as a researcher in NGOs such as IDESAM and recently (2014) he has been working as a researcher associated with research groups at the CNPQ (INPA), where he develops activities related to Earth observation, analysis and territorial planning in the Amazon using tools for geographic information systems and remote sensing. Its performance involves the analysis of human occupation of the Amazon territory; land use changes; prospecting for carbon projects via REDD+; elaboration, implementation, and monitoring of REDD+ projects and conservation projects. Develops forest ecology studies focused on the structure of forests, quantification of carbon stocks and carbon emissions from deforestation and forest degradation. Finally, it supported the formulation and articulation of strategic public policies to promote sustainable development in the Amazon region, at municipal and state levels. He is a member of the CNPQ research group: Environmental Services, Human Support Capacity and Impacts of Deforestation, led by INPA under the Coordination of the PhD. Phillip Martin Fearnside, where he develops research on the interaction of climate - human being - forests, with research focused on forest fires and exploitation of natural resources in indigenous territories in southern Amazonia, expansion of agricultural frontiers and territorial management in the arc of deforestation.

Ph.D. Lucas Santarosa: Graduated in Geography from the Faculty of Science, Technology, and Education (FCTE) of São Paulo State University (2014), a master's degree in Agronomy from the Faculty of Agricultural Sciences (FCA) of São Paulo State University (2016), and a Ph.D. in Geosciences and Environment from the Institute of Geosciences and Exact Sciences (IGCE) from São Paulo State University (2020). Geoscientist specialist in Geoprocessing and Remote Sensing works mainly on the following topics: spatial and temporal analysis (forecasting, machine learning, and geostatistics) of hydrological data and land use land cover, hydrodynamics of watersheds, aquifer recharge, isotopic hydrology, and soil physics.

MSc. Sociologist Marcelo da Silveira Rodrigues: Social scientist graduated from the Federal University of Juiz de Fora (UFJF) and post-graduated at master's level in Sociology by Federal University of Amazonas (UFAM). He has over ten years of professional experience in social and educational works, mainly in Amazon region, with a various type of publics and realities as riverside communities, traditional and indigenous people and urban sites. Furthermore, he has experience in the development and application of socioeconomic diagnostics and participatory processes.

Eng. Plinio Ruschi: Environmental Engineer graduated from the University Paulista "Julio de Mesquita Filho" – UNESP works in the project management and technical areas. He has experience in Environmental Assessment Reports, monitoring campaigns for flora, fauna, ground and surface water, noise, effluent, and air pollution, also in geoprocessing, remote sensing, and project management.

MSc. Eng. Renan A. Kamimura: Forestry engineer graduated from the Federal University of Lavras (UFPA) and post-graduated at the Master's level in Tropical Forest Sciences by the National Institute of Amazonian Research (INPA). He has over ten years of professional experience in the Amazon biome, especially in the areas of monitoring vegetation cover both using remote sensing and through field collection in a forest inventory. He had the opportunity to integrate several field expeditions to collect primary data in the Amazon, in indigenous lands: conservation units and rural settlements. He has worked on several projects for Sustainable Forest Management (MFS) and Reduction of Emissions from Deforestation and Forest Degradation (REDD+) in the scope of the voluntary forest carbon market as a developer and independent auditor.

Wallisson Maciel: Business Manager graduated from Uema – Universidade Estadual do Maranhão's State University (UEMA) and Environmental Expert and Auditor graduating at UNINTER (Pará). He has experience in auditing, monitoring campaigns for flora, fauna, socioeconomics diagnostics, participative diagnostics and coordination of carbon projects.

Eng. Yohana Cunha de Mello: Forestry engineer graduated from the University of São Paulo, , currently pursuing a master's degree in Biodiversity Conservation and Sustainable Development (ESCAS/IPE). She works in the field of landscape ecology, monitoring, certification, and risk analysis. She has practice in the use of geoprocessing, analysis and data integration tools, conducts various professional activities involving feasibility studies and monitoring of value chains. She had the opportunity to work in different territories and projects aimed at strengthening community forest management and socio-biodiversity products. In her graduation work she studied the development of methodologies for identifying areas of high conservation value (HCV) and currently participates as a trainee in verification audits of carbon projects (REDD+).

2.4.2 Management Team Experience (G4.2)

BRC technical staff is headed exclusively by professionals with more than 10 years of experience in elaboration, implementation, monitoring, and certification of forest carbon projects. In addition, BRCarbon, operates with more than 30 professionals and technicians that cover Project Management, Social, Biology, Engineering, GIS, advocacy, and Communication areas.

Nowadays BRC is project proponent of another grouped REDD+ project registered in VERRA with ID 4042. Also, BRC is co-proponent of two grouped ARR carbon projects: EMAS (ID 738) and Pratigi (ID1317), assuming all the technical responsibility regarding carbon aspects of these projects.

2.4.3 Project Management Partnerships/Team Development (G4.2)

Not applicable. As described in the previous section, the BRC staff has all the necessary expertise and know how to undertake this grouped REDD APD project, including primary data collection, elaboration of PD and MR, social engagement, implementation and monitoring of the project activities.

2.4.4 Financial Health of Implementing Organization(s) (G4.3)

BRC financials are commercially sensitive information and can be shared with any relevant stakeholder upon a signature of a non-disclosure agreement.

2.4.5 Avoidance of Corruption and Other Unethical Behavior (G4.3)

The BRC directors are not involved in any form of corruption, which is enforceable by the company's social statute and by BRCarbon's Ethics and Conduct Code (Appendix IX - BRC's code of ethics).

Any kind of involvement, direct or indirectly, in bribery, embezzlement, fraud, favoritism, cronyism, nepotism, extortion, and collusion are discouraged and disliked by Conduct Code and are punishable by expulsion or other measurements.

2.4.6 Commercially Sensitive Information (Rules 3.5.13 – 3.5.14)

For all project activity instances, already verified or under verification process, it is to be considered as commercially sensitive information any contract signed between the PP and landowners, trade, financial, commercial, scientific, technical, or other information, whose disclosure could reasonably be expected to result in a material financial loss or gain, compromising the contractual terms, deals or other negotiations stated by the project proponent.

It is also a sensitive information any information relates to internal policy decisions, financial, commercial, scientific, technical that the public disclosure could reasonably be expected to undermine or negatively affect the development and/or implementation of any project activity.

Information related to project social activity, the determination of the baseline scenario, demonstration of additionality, and estimation and monitoring of GHG emission reductions (including operational and capital expenditures) are not considered to be commercially sensitive and are provided in the public versions of the project documents.

2.5 Legal Status and Property Rights**2.5.1 Recognition of Property Rights (G5.1)**

All property rights are recognized, respected, and supported as the project is implemented only on private lands with the consent of the landowners. No statutory rights exist within the project area as the

land is privately owned. A complete set of land documents of all PAIs within the project scope can be found at Annex I_Land Tenure. A complete set of conservation agreements signed between the landowners and the project proponent can be found at Appendix I_Conservation Agreements.

2.5.2 Free, Prior and Informed Consent (G5.2)

This grouped project is implemented exclusively on private properties after signing a conservation agreement with the owners of the land where the different PAIs are located. Thus, the project did not invade private property, community property or government property uninvited.

The list of conservation agreements signed with different landowners can be found in Appendix I. Since the project takes place exclusively in private areas with the consent of the landowners, it is understood that no form of restitution or compensation is necessary.

The communities living within the project area (PAIs #2-5) are squatters, in other words, the communities do not have property rights but rather the right to use the land.

Even so, following the social engagement protocol, BRCarbon conducted a free prior and informed consent process with the communities living in PAIs #2-5 to ensure effective participation in the design of the project and fair sharing of benefits arising from implementation of project activities.

This consent process was carried out during the project validation stage, as described in the validated PD, having previously undergone scrutiny by a validation and verification body.

There are no communities living within the project area in PAIs #6-9. However, there are communities in the surrounding area that were mapped as relevant because they use or depend in some way on the project area. In this way, BRCarbon also conducted a social engagement process to ensure effective participation in the project design and fair sharing of benefits arising from the implementation of project activities. This social engagement process, for PAIs #6-9, is described in this monitoring report in sections 2.2.5 and 2.3.3.

In any case, no property rights were affected by the implementation of the project.

2.5.3 Property Right Protection (G5.3)

None of the already verified or under verification project activity instance had people relocation, which can be demonstrated in this document by the project activities description, and through direct observations in the field and interviews with community members.

On the contrary, the project was designed to respect the traditional communities' areas of use, as evidenced PAIs #1-5, by the project area boundaries, which exclude pasture areas and adjacent forests. The same approach adopted to PAIs #1-5, is applied to new instances when applicable.

Regarding PAIs #6-9

Project activities have not resulted in the relocation of people, as evidenced in this document through the description of project activities and through direct observations in the field and interviews with landowners and community members.

The grouped project, as well as its instances, are idealized and designed to respect the traditional use areas of the communities. This is evidenced by the boundaries of the project area, which exclude grazing lands and adjacent forests and extend the benefits of the project beyond the project boundaries to the communities residing in the project area.

2.5.4 Identification of Illegal Activity (G5.4)

For all project activity instances, already verified or under verification, the pressure for illegal deforestation is widely observed and commonly carried out in rural properties located in the Amazon, "Deforestation Arch" and in the deforestation expansion fronts. In this way, conservation activities need to avoid both planned and illegal deforestation.

Illegal activities that could impact the project are hunting, logging, and mining. The process of identifying threats and risks to the permanence of carbon stocks is done for all instances and has occurred throughout the initial analyses in a GIS environment, identifying through monitoring data sources, such as PRODES, DETER, MAPBIOMAS and remote sensing data (Landsat images, Sentinel, Google Earth) the dynamics of land use in the entire rural property and within the PAI area.

After the desk analysis, any potential illegal activities occurring within the project areas were identified in the field and registered. A mitigation plan for the illegal activities found is on the run and encompasses environmental education, training, promotion of sustainable activities for income generation, monitoring and supervision by the competent authorities.

Therefore, for all project activity instances, short, medium, and long-term customized strategies are defined to address the risk to the carbon stocks from illegal (unplanned) activities, in a way to guarantee the benefits to the climate, community and biodiversity over the project lifetime.

On PAI #4, some illegal activities were identified, evolving deforestation in 7 polygons of Seringal Porongaba. This occurrence was held by "*Batalhão de Policiamento Ambiental – BPA*" of Acre's State Military Police, by Service Order number 075/2022, entitled "*OPERAÇÃO GUARDIÕES DA FRONTEIRA*

20/2022". This police operation occurred between November 23rd and November 30th of 2022, that found a total of 16 deforestation spots (Annex II - Illegal Activities).

Regarding PAIs #6-9

The pressure for illegal deforestation is widely observed and commonly carried out in rural properties located in the Amazon "Deforestation Arch" and in the deforestation expansion fronts. In this way, conservation activities need to avoid both planned and illegal deforestation.

Illegal activities that might affect the project's impacts consist of hunting, logging, and mining activities.

The carbon stocks permanence threats and risks identifying process has occurred throughout the initial analyses in a GIS environment. The property and PAI area dynamics of land use were identified through monitoring data sources, such as PRODES, DETER, MAPBIOMAS and remote sensing data (Landsat images, Sentinel, Google Earth).

After the desk analysis, any potential illegal activities occurring within the project areas were identified in the field and registered. A mitigation plan for the illegal activities found is on the run and encompasses environmental education, training, promotion of sustainable activities for income generation, monitoring and supervision by the competent authorities.

Therefore, short, medium, and long-term strategies are defined to address the risk to the carbon stocks from illegal (unplanned) activities, in a way to guarantee the benefits to the climate, community and biodiversity over the lifetime of the project.

2.5.5 Ongoing Disputes (G5.5)

At the second monitoring period, the conflicts on the Potiguar farm were resolved amicably through dialogue between the project proponent and the family of squatters who reside on the Potiguar farm, following stage 01 of the project's grievance and redress procedure. The squatter family located on the Potiguar farm had their rights to use the land their traditionally occupied in the territory recognized by the project proponent and received the benefits coming from the project activities. Conflicts on the Porongaba farm remain active and are being managed by the project proponent. During the current monitoring period, the project proponent identified the squatter families that traditionally occupy the region and demarcated areas for land donation. Thus, the owner will recognize these families use rights as property rights and donate land titles to the traditional families who live on the Porongaba farm and who freely accepted this proposal. During this monitored period, the owner also identified and promoted dialogue with land grabbers who had recently arrived in the territory. At these meetings, the project proponent presented the land documentation of the rural property, in order to explain to the invaders that the land is private and that they were committing a crime of trespassing and an environmental crime by invading an area and deforesting a

piece of land. Since a peaceful solution to the problem has not been achieved during the current monitored period, the project proponent forwarded the issue to the competent bodies, namely the environmental police and public ministry, so that they can take the necessary measures. For all intents and purposes, these land grabbers are being treated as deforestation agents by the project proponent. In this way, the project proponent followed step 03 of its grievance and redress mechanism, addressing the issue to an independent arbitration.

For new instances information regarding the ongoing disputes, there were no disputes for land nor resource in the project areas.

2.5.6 National and Local Laws (G5.6)

In a wide overview of legal aspects, applied to all PAIs included in this grouped project, the project observes the principles established in the Federal Constitution, as per article 225, by contribution to ecologically well-balanced environment and article 224, paragraph 1, items (I) and (III) by contribution to conservation and restoration of essential ecological processes, while supporting the preservation of attributes beyond the legal environment requirements.

The GPD as whole is encompassed by principles established in the **National Environmental Policy** - law number 6,938 from August 31st, 1981, which declares the objectives of conservation, improvement and recovery of environmental quality that is conducive to life, having among its principles the protection of ecosystems with the conservation of relevant areas (article 2, IV) and the protection of areas threatened by degradation (item IX). Another important law for the development of the project is Federal Law number 12.305, from August 2nd of 2010, that institutes the National Policy of Solid Residue.

Regarding the land use national policy, the most important regulatory framework is the **Vegetation Code**, law number 12,651, from May 2012. This law states not only the forest category that must be conserved inside the private properties, but also the maximum area of native vegetation that can be converted in other land uses for economic purposes.

The Amazon APD grouped project was assembled to promote conservation in areas that in the absence of the project activities, would be legal deforested (20% of the property in Amazon biome) to accommodate commercial activities, as cattle rising and agriculture, as per the article 12 of the Vegetation Code, law 12.651.

The project is also in straight line with the Federal Law no. 12,187, of December 29th, 2009, which instituted the National Climate Change Policy, the State Law 2.308 from October 2010[1] which instituted the State System of Incentives for Environmental Services – SISA and the Incentive Program for Environmental Services - ISA Carbon, the state Law no. 1,904, of June 5th, 2007, which instituted the

Ecological Economic Zoning of the State of Acre - ZEE / AC and the guidelines of the State Policy for the Valorization of Forest Environmental Assets.

The project is also in line with Law 14,119 / 2012, which defines concepts, objectives, guidelines, actions, and criteria for the implementation of the National Policy for Payment for Environmental Services (PNPSA), institutes the National Register of Payment for Environmental Services (CNPSA) and the Federal Program for Payment for Environmental Services (PFPSA) and provides on payment contracts for environmental services. Furthermore, these laws go according to the National Environmental Council / Federal Environmental Ministry resolution number 237, from 2017, that provides for environmental licensing.

According to the Law 14,119/2021 carbon sequestration is considered an ecosystem service with relevant benefits to society in terms of maintenance, recovery, or improvement of environmental conditions (Art.2, § II) and the Federal Program for Payment for Environmental Services (PFPSA) will promote actions of maintenance of areas covered by native vegetation that would be subject to suppression authorization for alternative and economic use (Art. 7, § VII).

The project is also based on the Federal Laws number 5.197, from January 3rd of 1967, that regulates fauna protection and provides other provisions, and number 9.605, from February 12nd of 1998, that provides for criminal and administrative sanctions derived from the environment's harmful conduct and activities, and other provisions.

Finally, despite not encompassing indigenous areas, or natural areas used for these people, has applied to the project area residents, the consultation free, prior, and informed consent approach (FPIC), as per the Convention no. 169 of the ILO and the United Nations Declaration on the Rights of Indigenous People. This population participated from the project assembling since its beginning, as presented in the community section.

Following the government attribution's sphere, **Pará and Amazonas State legal instruments** are shown below.

2.5.6.1 Amazonas State Legal Instruments

State Law number 1.532, from 1982 – regulation of the State Politics of Prevention and Control of pollution, Improvement and Environment Recuperation, and of the Natural Resources Protection.

State Law number 3.525, from 2010 - Provides the creation of the Council of Sustainable Development of People and Traditional Communities of the Amazonas State – CDSPCT/AM, in the organizational structure of the State Secretariat of the Environment and Sustainable Development.

State Law number 3.785, from 2012 - Provides for environmental licensing in the Amazon State.

State Law number 4.222, from 2015 - Institutes the State Technical Register of Potentially Polluting Activities or Users of Environmental Resources, member of the National Environmental System - SISNAMA, the Environmental Control and Inspection Fee (TCFA/AM) in accordance with Federal Law n. 6,938, of August 31, 1981, and its amendments, and gives other measures.

State Law number 4.457, 2017 – Institutes the State Policy of Solid Waste in Amazonas/AM and gives another providence.

Complementary Law number 187, from 2018 – Disciplines the execution of the article 220 of the State Constitution, that institutes the State Council of Environment of the Amazonas State (CEMAAM) and dispose of the State Fund of Environment (FEMA) and gives other measures.

Ordinance number 41.863, from 2020 - This Decree establishes norms for the execution of the State Policy on Solid Waste.

CERH-AM Normative Resolution number 001, from 2016 – The Internal Regulations of the State Council of Water Resources are instituted in the form of the Annex to this Normative Resolution.

Ordinary State Law number 5.695, from 2021 - Amends, as specified, Law No. 4,222, of October 8, 2015, which "Institutes the State Technical Register of Potentially Polluting Activities or Users of Environmental Resources, part of the National Environmental System - SISNAMA, the Control Fee and Environmental Inspection (TCFA/AM) in accordance with Federal Law No. 6938, of August 31, 1981 and its amendments, and makes other provisions", and makes other provisions.

State Law number 5.755, from 2021 - Provides the reorganization of the Council for the Sustainable Development of Traditional Peoples and Communities of the State of Amazonas, established by Law No. 3,525, of July 15, 2010, and other measures.

State Law number 5.491, from 2021 - Amends the caput of art. 12, the sole paragraph of art. 13, § 1 of art. 14 and sole paragraph of art. 15 of LAW No. 3,785, of July 24, 2012, which "Provides for environmental licensing in the State of Amazonas, Revokes Law No. 3,219, of December 28, 2007, and makes other provisions."

Ordinary State Law number 6.014, from 2022 - Institutes an administrative term, intended for analysis and decision regarding the granting or renewal of environmental licensing, in compliance with Complementary Law No. 140/2011 and CONAMA Resolution No. 237/97.

State Law number 6.052, from 2022 – Recognizes the contribution of indigenous peoples to the preservation of forests, culture, folklore, customs, legends, gastronomy, handicrafts and language.

2.5.6.2 Pará State legal instruments

Following the government attribution's sphere, **Pará's State legal instruments** are shown below.

Ordinary Law number 5,887, from 1995 – that provides for the Pará's State Environmental Policy and other provisions.

Area Permanent - APP of rural properties, within the scope of State of Pará, and makes other provisions.

Ordinary Law number 7,398, from 2010 – that provides for the Ecological-Economic Zoning (ZEE) of the East Zone and *Calha Norte* of the State of Pará.

Decree number 2,099 of 2010 – that provides for the maintenance, restoration, conduction of natural regeneration, compensation and composition of the Legal Reserve area of rural properties in the State of Pará and other provisions.

Normative Instruction number 06, from May 19th, 2011 – that define land use conversion procedures through authorization of Forest Suppression in the real estate and rural properties in the Legal Amazon, according to the specifications detailed below and Attachments.

Normative Instruction number 02, from July, 06th 2015 – that Provides for Authorization for Vegetation Suppression - ASV, within the scope of environmental licensing processes of the Secretary of State for the Environment and Sustainability of Pará - SEMAS/PA and gives other arrangements.

Normative Instruction number 08, from October 28th, 2015 – that defines administrative procedures for the carrying out cleaning and authorization of deletion, the be carried out in areas of secondary vegetation in an early stage of regeneration, located outside Legal Reserve and Preservation

Normative Instruction number 05, from May 3rd, 2019 – SEMAS – that provides for technical procedures for elaboration, presentation, execution and evaluation Technical Sustainable Forest Management Plan (PMFS) in native forests explored or not and their forms of succession in the State of Pará and gives other arrangements.

Ordinary Law number 8,878, of 2019 – that provides for the land regularization of rural and non-rural occupations in public lands in the state of Pará, revokes Law No. 7.289, of July 24, 2009, and Decree-Law No. 57, dated August 22, 1969.

Decree No. 1,190, of 2020 – that regulates State Law No. 8,878, of July 8, 2019, to provide for land regularization in rural areas, and other measures.

Ordinary Law number 9,048, of 2020 – that establishes the State Policy on Climate Change of Pará (PEMC/PA), and other measures.

COEMA resolution number 162 of 2021 – that establishes the activities of local environmental impact, for the purposes of environmental licensing, under the competence of the Municipalities within the State of Pará, and other measures.

SEMAS/Pará Decree number 2,744, of 2022 – that provides for the Integrated Action Program for Sustainable Territories (PTS).

SEMAS/Pará Decree number 2,750, of 2022 – provides for the guidelines and procedures for preparing the State Plan for the Recovery of Native Vegetation in the State of Pará (PRVN) and creates the Working Group for the preparation of the State Plan for the Recovery of Native Vegetation in the State of Pará (GT-PRVN).

Following the government attribution's sphere, the **municipality's laws** are shown below, according to each municipality.

2.5.6.3 Manicoré (AM) Municipality Legal Instruments

Municipal Law number 810, from 2013 – Authorize the Municipality Executive to develop actions to implement the “Minha Casa, Minha Vida” Program (PMCMV)

Municipal Law number 828, from 2014 – Dispose about the Municipality Inspection Service (SIM) in Manicoré, establish rules and procedures of sanitary inspection in establishments that produce products of animal and vegetable origin, and gives other providence.

Municipal Law number 992, from 2022 – Dispose about the Municipal Council of Environment and Development (COMDEMA) of Manicoré and gives other providence.

Municipal Law number 995, from 2022 – Dispose about the Unique System of Social Assistance (SUAS) of Manicoré Municipality/AM and gives other providence.

Municipal Law number 817, from 2013 – Dispose about the Sanitary Code of the Manicoré Municipality, establish sanitary infraction and the punishment, determinates the administrative procedures to

Municipal Law number 817, from 2013 – Dispose about the sanitary code of Manicoré Municipality, establish sanitary infractions and punishments, determinates the administrative procedures to verificate the sanitary infraction, institutes the sanitary inspections taxes, sanitary license, inspection sanitary booklet and gives other providence.

2.5.6.4 Paragominas (PA) Municipality

Law number 644/07, from 2007 – that Institutes the Municipality Environmental Policy and other provisions.

Law number 765/11, from 2011 – that Institutes the Municipal Environmental Code (CAM), containing the Policy and the Municipal System of Paragominas.

2.5.6.5 Rondon do Pará (PA) Municipality

Law number 421/2002, from 2002 – that provides for the Policy for the Protection, Control, Conservation, and Environment Recovery and gives other provisions.

2.5.6.6 Dom Eliseu (PA) Municipality

Law number 444, from 2017 – SEMMA – that Provides for the Reform of the Administrative Structure of the Municipality of Dom Eliseu, and other measures.

2.5.6.7 Ipixuna do Pará (PA) Municipality

Law number 370, from 2020 – SEMMA/ Ipixuna do Pará – Pará – That establishing the new municipal environmental policy of Ipixuna do Pará and other provisions.

2.5.6.8 Tomé-Açu (PA) Municipality

Complementary Law number 11, from 2006 – that establishes the Master Plan for Sustainable Development of the Municipality of Tomé-Açu, establishes the guidelines and norms for the physical-territorial and urban organization and takes other measures.

3 CLIMATE

Legal Protection: The grouped project main strategy to promote the APD, consists of signing long-term conservation agreements with private landowners in the Legal Amazon. The agreements are made for 30 years and imply landowners' commitment to the conservation of specific forest areas on their properties. In other words, by signing the agreement, landowners undertake not to carry out activities that involve the forest conversion to other land uses, such as livestock or agriculture, for the project lifetime. Agreements can be renewed for up to 100 years. BRC will be responsible for the project development, the

implementation of the project activities, the project monitoring and the validation and verification of the grouped project.

Forest Surveillance: deforestation, forest degradation and burn scars will be monitored through satellite images associated with ground truth verifications annually. Land use change maps and orbital imagery will be collected from PRODES2 & DETER3/INPE4, Mapbiomas and ESA5. The area burnt is measured according to $\Delta NBR6$ spectral index and verified with high spatial resolution satellite imagery from Sentinel, along with ground truth verifications.

Forest Biomass Inventory: aboveground biomass in trees will be estimated through permanent plots systematically installed over the project area. Non-tree biomass component and below ground biomass on tree and non-tree component will be indirectly estimated through secondary data and default values for conversion factors from peer-review studies and reputable information sources. Dead wood and litter will be estimated from direct measurement in the same permanent plots. Biomass estimates are considered fixed during the first baseline period. Biomass will be re-measured within a 10-year interval. Carbon stock change in every pool will be estimated by stock difference method. Estimates will be considered within a 90% confidence interval. New estimates shall take precedence over previous estimates where outside (i.e., greater than or less than) the 90% confidence interval of the previous estimates. For a complete description over forest biomass inventory methods check standard operational procedures (Appendix IV – Carbon Pool Measures).

Sustainable Forest Management: forest management operations can be carried out in the project area if Forest Stewardship Council (FSC) certified. Responsible forest management is an economic alternative appropriate to the Amazon region and compatible with the conservation of forest cover in the project area. The FSC certification ensures the use of reduced impact logging techniques, mitigating initial losses in carbon stocks, enabling the natural regeneration of the forest and the restoration of carbon stocks to the initial levels in the medium-long term. The impacts of forest management, GHG emissions associated with the forest management activity and forest regeneration will be assessed in accordance with the project's monitoring plan and in consideration of VMD0015 v2.2 criteria. In these cases, BRC will also offer consultancy services to adapt the forest management plan, training for workers involved in the forest management operation and other necessary to comply with the FSC standard.

Wildfire Prevention and Fire Fighting: wildfires in tropical forests are associated with human activity and occur with greater frequency, intensity and severity in drier years and degraded forests. Such conditions can be significantly present in the project area, which will depend on the level of territory occupation and the occurrence of climatic anomalies, such as El Nino. Thus, to protect carbon stocks in the project area, the project will work with environmental education and training on land management, fire brakes implementation, formation, and equipment of fire brigades and possibly, with the implementation of

monitoring towers equipped with cameras capable of detecting smoke. Environmental education and land management training activity will be related to fire ecology and good practices in preparing areas for cultivation, with focus on preventing the fire spread into forests. The training and the equipment of voluntary fire brigades will be focused on combat actions⁷. The monitoring towers will serve the purpose of reducing the response time of the brigade members, increasing their efficiency in fighting forest fires. The cameras attached to the monitoring towers can detect smoke patterns within a radius of 15 km in less than 3 minutes, triggering a signal with the location of the fire spot automatically to a control center, which can then alert and mobilize the brigades for combat.

Leakage mitigation: considering the project scope, leakage can be understood as the legal deforestation attributable to landowners (project participants) in other areas of their property (outside the project scope). Thus, leakage mitigation actions will be related to leakage monitoring, estimation of GHG emissions attributable to activity shifting and deduction of the project's net GHG emissions reduction in a specific monitoring period. This project activity will also be associated with advocacy with landowners focusing on the reduction of GHG emissions due to activity shifting leakage in future monitoring periods.

3.1 Monitoring GHG Emission Reductions and Removals

3.1.1 Data and Parameters Available at Validation

Data / Parameter	AA_{planned,i,t}
Data unit	Ha
Description	Annual area of baseline planned deforestation for stratum i in year t.
Source of data	Calculated based on VMD0006 v1.3 equation 5.
Value applied:	The table has been omitted due to its size. Please refer to the values listed in table 14 - Appendix II - Calculus Table.
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on total area of planned deforestation over the baseline period for stratum I ($A_{planned,i}$), the projected annual proportion of land that will be deforested in stratum i during year t ($D\%_{planned,i,t}$) and the Likelihood of deforestation for stratum I ($L-Di$) according to VMD0006 v1.3 equation 5.
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	A_{planned,i}
Data unit	Ha

Description	Total area of planned deforestation over the fixed baseline period for stratum i.
Source of data	Remote Sensing data.
Value applied:	Please refer to the values listed in table 14- Appendix II - Calculus Table
Justification of choice of data or description of measurement methods and procedures applied	Corresponding to what is recognized as an immediate site-specific threat of deforestation, which, in its turn, is a function of the legal permissibility for deforestation, the suitability of the project area for conversion to alternative non-forest land use, the government approval for deforestation and a management plan for deforesting the project area. See section 3.4 of the Project Description for a complete description of measurement methods and procedures applied.
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	$D\%_{\text{planned},i,t}$
Data unit	% year-1
Description	Projected annual proportion of land that will be deforested in stratum i at year t.
Source of data	For PAIs #1-5, the data was obtained from forestry exploration plans submitted to the environmental agency responsible for issuing permits for vegetation suppression in each state. For PAIs #6-9, six different deforestation permits issued in similar areas were used to compose the new deforestation rate of 34 % per year. This rate corresponds to the average percentage of authorized and actually executed deforestation in the proxy areas during the validity period of the deforestation permit.
Value applied:	The table has been omitted due to its size. Please refer to the values listed in table 14- Appendix II - Calculus Table.
Justification of choice of data or description of measurement methods and procedures applied	Where a valid verifiable plan exists for rate at which deforestation is projected to occur, this rate must be used. If no verifiable plan exists, the rate must be established by examining proxy areas. Proxy areas may or may not be under the management of the project area's baseline agent of deforestation or class of deforestation agents. A minimum

	of 6 proxy areas must be included, according to VMD0006 v1.3, section 1.3 criteria.
Purpose of Data	Determination of baseline scenario.
Comments	-

Data / Parameter	$L-D_i$
Data unit	%
Description	Likelihood of deforestation in stratum i.
Source of data	Analysis of Land Tenure.
Value applied:	100%
Justification of choice of data or description of measurement methods and procedures applied	L-Di is equal to 100% for all planned deforestation areas that are not both under Government control and zoned for deforestation, according to VMD0006 v1.3, section 1.4.
Purpose of Data	Determination of baseline scenario.
Comments	-

Data / Parameter	$\Delta C_{AB_tree,i}$														
Data unit	t CO ₂ e.ha ⁻¹														
Description	Baseline carbon stock change in aboveground tree biomass in stratum i; t CO ₂ -e ha ⁻¹ .														
Source of data	Calculated based on VMD0006 v1.3 equation 6.														
Value applied:	Please refer to the values listed in table 15- Appendix II - Calculus Table <table border="1"> <thead> <tr> <th>Stratum (i)</th><th>$\Delta C_{AB_tree,i}$</th></tr> </thead> <tbody> <tr> <td>As</td><td>456.26</td></tr> <tr> <td>Ds</td><td>447.23</td></tr> <tr> <td>Aa</td><td>369.94</td></tr> <tr> <td>Ab</td><td>402.00</td></tr> <tr> <td>D</td><td>543.65</td></tr> <tr> <td>Db</td><td>463.74</td></tr> </tbody> </table>	Stratum (i)	$\Delta C_{AB_tree,i}$	As	456.26	Ds	447.23	Aa	369.94	Ab	402.00	D	543.65	Db	463.74
Stratum (i)	$\Delta C_{AB_tree,i}$														
As	456.26														
Ds	447.23														
Aa	369.94														
Ab	402.00														
D	543.65														
Db	463.74														
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on the forest carbon stock in aboveground tree biomass in stratum I ($C_{AB_tree,bsl,i}$) and the post-deforestation carbon stock in aboveground tree biomass in														

	stratum I ($C_{AB_tree,post,i}$), according to VMD0006 v1.3 equation 6.
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	$\Delta C_{BB_tree,i}$														
Data unit	t CO ₂ e.ha ⁻¹														
Description	Baseline carbon stock change in belowground tree biomass in stratum i.														
Source of data	Calculated based on VMD0006 v1.3 equation 8.														
Value applied:	Please refer to the values listed in table 16 - Appendix II - Calculus Table <table> <tr> <th>Stratum (i)</th><th>$\Delta C_{BB_tree,i}$</th></tr> <tr> <td>As</td><td>45.61</td></tr> <tr> <td>Ds</td><td>138.65</td></tr> <tr> <td>Aa</td><td>36.98</td></tr> <tr> <td>Ab</td><td>40.19</td></tr> <tr> <td>D</td><td>168.55</td></tr> <tr> <td>Db</td><td>143.77</td></tr> </table>	Stratum (i)	$\Delta C_{BB_tree,i}$	As	45.61	Ds	138.65	Aa	36.98	Ab	40.19	D	168.55	Db	143.77
Stratum (i)	$\Delta C_{BB_tree,i}$														
As	45.61														
Ds	138.65														
Aa	36.98														
Ab	40.19														
D	168.55														
Db	143.77														
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on the forest carbon stock in aboveground tree biomass in stratum I ($C_{AB_tree,bsl,i}$) and the post-deforestation carbon stock in aboveground tree biomass in stratum I ($C_{AB_tree,post,i}$); according to VMD0006 v1.3 equation 8.														
Purpose of Data	Calculation of baseline emissions.														
Comments	-														

Data / Parameter	$\Delta C_{AB_non-tree,i}$
Data unit	t CO ₂ e.ha ⁻¹
Description	Baseline carbon stock change in aboveground non-tree biomass in stratum i.
Source of data	Calculated based on VMD0006 v1.3 equation 7.
Value applied:	Please refer to the values listed in table 17- Appendix II - Calculus Table

	<table> <tr> <th>Stratum (i)</th><th>$\Delta C_{AB_non-tree,i}$</th></tr> <tr> <td>As</td><td>33.83</td></tr> <tr> <td>Ds</td><td>8.71</td></tr> <tr> <td>Aa</td><td>24.60</td></tr> <tr> <td>Ab</td><td>28.03</td></tr> <tr> <td>D</td><td>13.82</td></tr> <tr> <td>Db</td><td>9.59</td></tr> </table>	Stratum (i)	$\Delta C_{AB_non-tree,i}$	As	33.83	Ds	8.71	Aa	24.60	Ab	28.03	D	13.82	Db	9.59
Stratum (i)	$\Delta C_{AB_non-tree,i}$														
As	33.83														
Ds	8.71														
Aa	24.60														
Ab	28.03														
D	13.82														
Db	9.59														
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on forest carbon stock in aboveground non-tree vegetation in stratum ($C_{AB_non-tree,bsl,i}$) and Post-deforestation carbon stock in aboveground non-tree vegetation in stratum i ($C_{AB_non-tree,post,i}$); according to VMD0006 v1.3 equation 7.														
Purpose of Data	Calculation of baseline emissions.														
Comments	-														

Data / Parameter	$\Delta C_{BB_non-tree,i}$														
Data unit	t CO ₂ e.ha ⁻¹														
Description	Baseline carbon stock change in belowground non-tree biomass in stratum i.														
Source of data	Calculated based on VMD0006 v1.3 equation 9														
Value applied:	Please refer to the values listed in table 18- Appendix II - Calculus Table <table> <tr> <th>Stratum (i)</th><th>$\Delta C_{BB_non-tree,i}$</th></tr> <tr> <td>As</td><td>6.77</td></tr> <tr> <td>Ds</td><td>1.74</td></tr> <tr> <td>Aa</td><td>4.92</td></tr> <tr> <td>Ab</td><td>5.61</td></tr> <tr> <td>D</td><td>2.76</td></tr> <tr> <td>Db</td><td>1.92</td></tr> </table>	Stratum (i)	$\Delta C_{BB_non-tree,i}$	As	6.77	Ds	1.74	Aa	4.92	Ab	5.61	D	2.76	Db	1.92
Stratum (i)	$\Delta C_{BB_non-tree,i}$														
As	6.77														
Ds	1.74														
Aa	4.92														
Ab	5.61														
D	2.76														
Db	1.92														
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on forest carbon stock in belowground non-tree vegetation in stratum ($C_{BB_nontree,bsl,i}$) and post-deforestation carbon stock in belowground non-tree vegetation in stratum i ($C_{BB_nontree,post,i}$), according to VMD0006 v1.3 equation 9.														
Purpose of Data	Calculation of baseline emissions.														
Comments	-														

Data / Parameter	$\Delta C_{DW,i}$														
Data unit	t CO ₂ e.ha ⁻¹														
Description	Baseline carbon stock change in dead wood in stratum i.														
Source of data	Calculated based on VMD0006 v1.3 equation 10.														
Value applied:	See the values applied in the table 19 (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table border="1"> <thead> <tr> <th>Stratum (i)</th><th>$\Delta C_{DW,i}$</th></tr> </thead> <tbody> <tr> <td>As</td><td>34.29</td></tr> <tr> <td>Ds</td><td>22.40</td></tr> <tr> <td>Aa</td><td>14.20</td></tr> <tr> <td>Ab</td><td>8.60</td></tr> <tr> <td>D</td><td>39.03</td></tr> <tr> <td>Db</td><td>31.54</td></tr> </tbody> </table>	Stratum (i)	$\Delta C_{DW,i}$	As	34.29	Ds	22.40	Aa	14.20	Ab	8.60	D	39.03	Db	31.54
Stratum (i)	$\Delta C_{DW,i}$														
As	34.29														
Ds	22.40														
Aa	14.20														
Ab	8.60														
D	39.03														
Db	31.54														
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on forest carbon stock in deadwood in stratum ($C_{DW,bsl,i}$) and post-deforestation carbon stock in deadwood in stratum i ($C_{DW,post,i}$), according to VMD0006 v1.3 equation 10.														
Purpose of Data	Calculation of baseline emissions.														
Comments	-														

Data / Parameter	$\Delta C_{LI,i}$														
Data unit	t CO ₂ e.ha ⁻¹														
Description	Baseline carbon stock change in litter in stratum i.														
Source of data	Calculated based on VMD0006 v1.3 equation 11.														
Value applied:	See the values applied in table 20. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table border="1"> <thead> <tr> <th>Stratum (i)</th><th>$\Delta C_{LI,i}$</th></tr> </thead> <tbody> <tr> <td>As</td><td>19.06</td></tr> <tr> <td>Ds</td><td>24.16</td></tr> <tr> <td>Aa</td><td>9.49</td></tr> <tr> <td>Ab</td><td>9.64</td></tr> <tr> <td>D</td><td>13.96</td></tr> <tr> <td>Db</td><td>24.16</td></tr> </tbody> </table>	Stratum (i)	$\Delta C_{LI,i}$	As	19.06	Ds	24.16	Aa	9.49	Ab	9.64	D	13.96	Db	24.16
Stratum (i)	$\Delta C_{LI,i}$														
As	19.06														
Ds	24.16														
Aa	9.49														
Ab	9.64														
D	13.96														
Db	24.16														
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on forest carbon stock in litter in stratum ($C_{LI,bsl,i}$) and post-deforestation carbon stock in litter in stratum i ($C_{LI,post,i}$), according to VMD0006 v1.3 equation 11.														

Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	$\Delta C_{SOC,i}$														
Data unit	t CO ₂ e.ha ⁻¹														
Description	Baseline carbon stock change in soil organic carbon in stratum i.														
Source of data	Calculated based on VMD0006 v1.3 equation 12.														
Value applied:	See the values applied in table 21. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table border="1"> <thead> <tr> <th>Stratum (i)</th><th>$\Delta C_{SOC,i}$</th></tr> </thead> <tbody> <tr> <td>As</td><td>-28.68</td></tr> <tr> <td>Ds</td><td>-44.01</td></tr> <tr> <td>Aa</td><td>15.86</td></tr> <tr> <td>Ab</td><td>-1.21</td></tr> <tr> <td>D</td><td>-17.07</td></tr> <tr> <td>Db</td><td>-19.53</td></tr> </tbody> </table>	Stratum (i)	$\Delta C_{SOC,i}$	As	-28.68	Ds	-44.01	Aa	15.86	Ab	-1.21	D	-17.07	Db	-19.53
Stratum (i)	$\Delta C_{SOC,i}$														
As	-28.68														
Ds	-44.01														
Aa	15.86														
Ab	-1.21														
D	-17.07														
Db	-19.53														
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on forest carbon stock in soil organic carbon in stratum ($C_{SOC,bsl,i}$) and post-deforestation carbon stock in soil organic carbon in stratum i ($C_{SOC,PD-BSL,i}$), according to VMD0006 v1.3 equation 12.														
Purpose of Data	Calculation of baseline emissions.														
Comments	-														

Data / Parameter	$C_{AB_tree,i}$
Data unit	t CO ₂ e.ha ⁻¹
Description	Carbon stock in aboveground biomass in trees in the baseline in stratum i
Source of data	Forest inventory with field data and direct measurement. The mean carbon stock in aboveground tree biomass per unit area per stratum is estimated using sample fixed area plots and regional allometric equation for tree component.
Value applied:	See the values applied in table 15. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE)

	<table> <tr> <th>Stratum (i)</th><th>C_{AB_tree,bsl,i}</th></tr> <tr> <td>As</td><td>456.37</td></tr> <tr> <td>Ds</td><td>447.34</td></tr> <tr> <td>Aa</td><td>370.05</td></tr> <tr> <td>Ab</td><td>402.11</td></tr> <tr> <td>D</td><td>543.76</td></tr> <tr> <td>Db</td><td>463.85</td></tr> </table>	Stratum (i)	C _{AB_tree,bsl,i}	As	456.37	Ds	447.34	Aa	370.05	Ab	402.11	D	543.76	Db	463.85
Stratum (i)	C _{AB_tree,bsl,i}														
As	456.37														
Ds	447.34														
Aa	370.05														
Ab	402.11														
D	543.76														
Db	463.85														
Justification of choice of data or description of measurement methods and procedures applied	Forestry Inventory is performed according to VMD0001 v1.1 and VMD0016 v1.3 criteria.														
Purpose of Data	Calculation of baseline emissions.														
Comments	-														

Data / Parameter	C _{BB_tree,i}														
Data unit	t CO ₂ e.ha ⁻¹														
Description	Carbon stock in belowground biomass in trees in the baseline in stratum i														
Source of data	Calculated based on VMD0001 v1.1, equation 5.														
Value applied:	See the values applied in table 16. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table> <tr> <th>Stratum (i)</th><th>C_{BB_tree,bsl,i}</th></tr> <tr> <td>As</td><td>45.64</td></tr> <tr> <td>Ds</td><td>138.68</td></tr> <tr> <td>Aa</td><td>37.01</td></tr> <tr> <td>Ab</td><td>40.21</td></tr> <tr> <td>D</td><td>168.57</td></tr> <tr> <td>Db</td><td>143.79</td></tr> </table>	Stratum (i)	C _{BB_tree,bsl,i}	As	45.64	Ds	138.68	Aa	37.01	Ab	40.21	D	168.57	Db	143.79
Stratum (i)	C _{BB_tree,bsl,i}														
As	45.64														
Ds	138.68														
Aa	37.01														
Ab	40.21														
D	168.57														
Db	143.79														
Justification of choice of data or description of measurement methods and procedures applied	Calculated from carbon stock in aboveground biomass in trees in the baseline in stratum i (C _{AB_tree,i}) and root to shoot ratios (R), according to VMD0001 v1.1, equation 5.														
Purpose of Data	Calculation of baseline emissions.														
Comments	-														

Data / Parameter	R
Data unit	Dimensionless
Description	Root to shoot ratio appropriate to forest type.
Source of data	Nogueira (2008).
Value applied:	Dense forest = 0.31; Open forest = 0.1
Justification of choice of data or description of measurement methods and procedures applied	Eco-region-specific root to shoot ratio is used for accuracy.
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	$C_{AB_non-tree,i}$														
Data unit	t CO ₂ e.ha ⁻¹														
Description	Carbon stock in aboveground non-tree vegetation in the baseline in stratum i. Non-tree vegetation includes palms and vines. Trees with DBH lower than 10cm and shrubs were not considered.														
Source of data	Estimated based on carbon stock in aboveground biomass in trees in the baseline in stratum i ($C_{AB_tree,i}$) and previously published data (Nogueira et al., 2008), following VMD0001 v1.1, section 5, part 3 criteria.														
Value applied:	See the values applied in table 17. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table border="1"> <thead> <tr> <th>Stratum (i)</th><th>$C_{AB_non-tree,bsl,i}$</th></tr> </thead> <tbody> <tr> <td>As</td><td>48.83</td></tr> <tr> <td>Ds</td><td>23.71</td></tr> <tr> <td>Aa</td><td>39.60</td></tr> <tr> <td>Ab</td><td>43.03</td></tr> <tr> <td>D</td><td>28.82</td></tr> <tr> <td>Db</td><td>24.58</td></tr> </tbody> </table>	Stratum (i)	$C_{AB_non-tree,bsl,i}$	As	48.83	Ds	23.71	Aa	39.60	Ab	43.03	D	28.82	Db	24.58
Stratum (i)	$C_{AB_non-tree,bsl,i}$														
As	48.83														
Ds	23.71														
Aa	39.60														
Ab	43.03														
D	28.82														
Db	24.58														
Justification of choice of data or description of measurement methods and procedures applied	-														

Purpose of Data	Calculation of baseline emissions.
Comments	Values applied represent the percentage of the carbon stock in aboveground biomass in trees in the baseline in stratum I, found by Nogueira et al. (2008) for the same forest types in the same region.

Data / Parameter	$C_{BB_nontree,i}$														
Data unit	t CO ₂ e.ha ⁻¹														
Description	Carbon stock in belowground non-tree vegetation in the baseline in stratum i. Non-tree vegetation includes palms and vines. Trees with DBH lower than 10cm and shrubs were not considered.														
Source of data	Calculated based on VMD0001 v1.1, equation 13.														
Value applied:	See the values applied in table 18. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table border="1"> <thead> <tr> <th>Stratum (i)</th><th>$C_{BB_non-tree,bsl,i}$</th></tr> </thead> <tbody> <tr> <td>As</td><td>9.77</td></tr> <tr> <td>Ds</td><td>4.74</td></tr> <tr> <td>Aa</td><td>7.92</td></tr> <tr> <td>Ab</td><td>8.61</td></tr> <tr> <td>D</td><td>5.76</td></tr> <tr> <td>Db</td><td>4.92</td></tr> </tbody> </table>	Stratum (i)	$C_{BB_non-tree,bsl,i}$	As	9.77	Ds	4.74	Aa	7.92	Ab	8.61	D	5.76	Db	4.92
Stratum (i)	$C_{BB_non-tree,bsl,i}$														
As	9.77														
Ds	4.74														
Aa	7.92														
Ab	8.61														
D	5.76														
Db	4.92														
Justification of choice of data or description of measurement methods and procedures applied	Calculated from carbon stock in aboveground non-tree biomass in the baseline in stratum i ($C_{AB_nontree,i}$) and root to shoot ratios), according to VMD0001 v1.1, equation 13.														
Purpose of Data	Calculation of baseline emissions.														
Comments	-														

Data / Parameter	$C_{DW,i}$		
Data unit	t CO ₂ e.ha ⁻¹		
Description	Carbon stock in dead wood in the baseline in stratum i.		
Source of data	Calculated based on VMD0002 v1.0, equation 9.		
Value applied:	See the values applied in table 19. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table border="1"> <thead> <tr> <th>Stratum (i)</th><th>$C_{DW,bsl,i}$</th></tr> </thead> <tbody> </tbody> </table>	Stratum (i)	$C_{DW,bsl,i}$
Stratum (i)	$C_{DW,bsl,i}$		

		As	34.29	
		Ds	22.40	
		Aa	14.20	
		Ab	8.60	
		D	39.03	
		Db	31.54	
Justification of choice of data or description of measurement methods and procedures applied	Calculated from biomass of standing dead wood in stratum i (BSD_{wi}), biomass of lying dead wood in stratum (BLD_{wi}) and carbon fraction of dry matter in dead wood (CF_{dw}), according to VMD0002 v1.0, equation 9.			
Purpose of Data	Calculation of baseline emissions.			
Comments	-			

Data / Parameter	$C_{LI,i}$		
Data unit	t CO ₂ e.ha ⁻¹		
Description	Carbon stock in litter in the baseline in stratum i		
Source of data	Calculated based on VMD0003 v1.0, equation 1.		
Value applied:	See the values applied in table 20. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE)		
	Stratum (i)	$C_{LI,bsl,i}$	
	As	19.06	
	Ds	24.16	
	Aa	9.49	
	Ab	9.64	
	D	13.96	
	Db	24.16	
Justification of choice of data or description of measurement methods and procedures applied	Calculated from of litter in sample plot sp in stratum i ($B_{LI,sp,i}$), carbon fraction (CF) and total area of all sample plots in stratum i according to VMD0003 v1.0, equation 1.		
Purpose of Data	Calculation of baseline emissions.		
Comments	-		

Data / Parameter	$C_{SOC,i}$
Data unit	t CO ₂ e.ha ⁻¹

Description	Mean carbon stock in soil organic carbon in the baseline in stratum i.														
Source of data	Calculated based on VMD0004 v1.0, equation 1.														
Value applied:	See the values applied in table 21. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table border="1"> <thead> <tr> <th>Stratum (i)</th><th>C_{SOC,bsl,i}</th></tr> </thead> <tbody> <tr> <td>As</td><td>75.58</td></tr> <tr> <td>Ds</td><td>77.20</td></tr> <tr> <td>Aa</td><td>120.11</td></tr> <tr> <td>Ab</td><td>120.00</td></tr> <tr> <td>D</td><td>146.98</td></tr> <tr> <td>Db</td><td>84.72</td></tr> </tbody> </table>	Stratum (i)	C _{SOC,bsl,i}	As	75.58	Ds	77.20	Aa	120.11	Ab	120.00	D	146.98	Db	84.72
Stratum (i)	C _{SOC,bsl,i}														
As	75.58														
Ds	77.20														
Aa	120.11														
Ab	120.00														
D	146.98														
Db	84.72														
Justification of choice of data or description of measurement methods and procedures applied	Calculated from soil organic carbon of the sample in sample plot sp, stratum i; determined in the laboratory in g C/100 g soil (fine fraction <2 mm) (C _{SOCsample,sp,i}), bulk density of fine (<2 mm) fraction of mineral soil in sample plot sp, stratum i; determined in the laboratory in g fine fraction cm ⁻³ total sample volume (BD _{sample,sp,i}) and depth to which soil sample is collected in sample plot sp in stratum I (Dep _{sample,sp,i}), according to VMD0004 v1.0, equation 1.														
Purpose of Data	Calculation of baseline emissions.														
Comments	-														

Data / Parameter	C _{wp,i}																			
Data unit	t CO ₂ e.ha ⁻¹																			
Description	Baseline carbon stock change in in wood products in stratum i																			
Source of data	Calculated based on VMD0005 v1.1 equation 2																			
Value applied:	See the values applied in table 22. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table><tr><th>PAI</th><th>Stratum (i)</th><th>C_{WP,i}</th></tr><tr><td rowspan="2">PAI #1</td><td>As</td><td rowspan="2">0</td></tr><tr><td>Ds</td></tr><tr><td rowspan="2">PAI #2</td><td>Aa</td><td rowspan="2">0</td></tr><tr><td>Ab</td></tr><tr><td rowspan="2">PAIs #3-5</td><td>Aa</td><td></td></tr><tr><td>Ab</td><td></td></tr><tr><td>PAI #6</td><td>Db</td><td></td></tr></table>	PAI	Stratum (i)	C _{WP,i}	PAI #1	As	0	Ds	PAI #2	Aa	0	Ab	PAIs #3-5	Aa		Ab		PAI #6	Db	
PAI	Stratum (i)	C _{WP,i}																		
PAI #1	As	0																		
	Ds																			
PAI #2	Aa	0																		
	Ab																			
PAIs #3-5	Aa																			
	Ab																			
PAI #6	Db																			

	PAIs #7-9	D		
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on mean stock of extracted biomass carbon by class of wood product ty from stratum I ($C_{XB,ty,i}$) and the wood waste (the fraction immediately emitted through mill inefficiency by class of wood product) (WW_{ty}), according to VMD0005 v1.1 equation 2.			
Purpose of Data	Calculation of baseline emissions.			
Comments	-			

Data / Parameter	$C_{XB,ty,i}$
Data unit	t CO ₂ e.ha ⁻¹
Description	Mean stock of extracted biomass carbon by class of wood product ty from stratum i.
Source of data	Calculated based on VMD0005 v1.1 equation 1.
Value applied:	0
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on volume of timber extracted from stratum i (does not include slash left onsite) by species j and wood product class ty ($V_{ex,ty,j}$), mean wood density of species j (D_j), carbon fraction (CF) and the total area of stratum (A_i), according to VMD0005 v1.1 equation 1.
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	$V_{ex,ty,j}$
Data unit	m ³
Description	Volume of timber extracted from within stratum i (does not include slash left onsite) by species j and wood product class ty.
Source of data	Forest Exploration Plan (Annex IV – Baseline scenario)
Value applied:	0.
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on volume of timber extracted from stratum i (does not include slash left onsite) by species j and wood product class ty ($V_{ex,ty,j}$)
Purpose of Data	Calculation of baseline emissions.

Comments	-
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Data / Parameter	D_j
Data unit	t d.m.m ⁻³ .
Description	Mean wood density of species j.
Source of data	Wood Density Tropical Database.
Value applied:	Hardwood: 0.65 Sapwood: 0.5
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	CF
Data unit	Dimensionless
Description	Carbon fraction
Source of data	Nogueira et al. 2008
Value applied:	0.485
Justification of choice of data or description of measurement methods and procedures applied	Default factor calculated by Brazilian central Amazon.
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	SLF_{ty}
Data unit	Dimensionless
Description	Fraction of wood products that will be emitted to the atmosphere within 5 years of timber harvest by class of wood product ty.

Source of data	Winjun et al., 1998
Value applied:	0.2
Justification of choice of data or description of measurement methods and procedures applied	Default value suggested by VMD0005 v1.1.
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	OF_{ty}
Data unit	Dimensionless
Description	Fraction of wood products that will be emitted to the atmosphere between 5 and 100 years of timber harvest by class of wood product ty; dimensionless.
Source of data	Winjun et al., 1998.
Value applied:	0.8
Justification of choice of data or description of measurement methods and procedures applied	Default value suggested by Winjun et al., 1998.
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	$C_{WP100,i}$										
Data unit	t CO ₂ -e ha ⁻¹										
Description	Carbon stock entering the wood products pool at the time of deforestation that is expected to be emitted over 100-years from stratum i.										
Source of data	Calculated based on VMD0005 v1.1 equation 3.										
Value applied:	See the values applied in table 22. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table><tr><th>PAI</th><th>Stratum (i)</th><th>$C_{WP100,i}$</th></tr><tr><td rowspan="2">PAI#1</td><td>As</td><td rowspan="2">0</td></tr><tr><td>Ds</td></tr><tr><td>PAIs #2</td><td>Aa</td><td>0</td></tr></table>	PAI	Stratum (i)	$C_{WP100,i}$	PAI#1	As	0	Ds	PAIs #2	Aa	0
PAI	Stratum (i)	$C_{WP100,i}$									
PAI#1	As	0									
	Ds										
PAIs #2	Aa	0									

		Ab	0	
	PAIs #3-5	Aa		
		Ab		
	PAI #6	Db		
	PAIs #7-9	D		
Justification of choice of data or description of measurement methods and procedures applied	Estimated base on carbon stock entering wood products pool at time of deforestation from stratum I ($C_{WP,i}$), fraction of wood products that will be emitted to the atmosphere within 5 years of timber harvest by class of wood product ty (SLF_{ty}), and Fraction of wood products that will be emitted to the atmosphere between 5 and 100 years of timber harvest by class of wood product ty (OF_{ty}).			
Purpose of Data	Calculation of baseline emissions.			
Comments	-			

Data / Parameter	$C_{AB_tree,post,i}$														
Data unit	t CO ₂ e.ha-1														
Description	Post-deforestation carbon stock in aboveground tree biomass in stratum i.														
Source of data	Secondary data from peer-reviewed literature (Silva Neto et al., 2012).														
Value applied:	See the values applied in the table 15. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table border="1"> <thead> <tr> <th>Stratum (i)</th><th>$C_{AB_tree,post,i}$</th></tr> </thead> <tbody> <tr><td>As</td><td>0.1</td></tr> <tr><td>Ds</td><td>0.1</td></tr> <tr><td>Aa</td><td>0.1</td></tr> <tr><td>Ab</td><td>0.1</td></tr> <tr><td>Db</td><td>0.1</td></tr> <tr><td>D</td><td>0.1</td></tr> </tbody> </table>	Stratum (i)	$C_{AB_tree,post,i}$	As	0.1	Ds	0.1	Aa	0.1	Ab	0.1	Db	0.1	D	0.1
Stratum (i)	$C_{AB_tree,post,i}$														
As	0.1														
Ds	0.1														
Aa	0.1														
Ab	0.1														
Db	0.1														
D	0.1														
Justification of choice of data or description of measurement methods and procedures applied	-														
Purpose of Data	Calculation of baseline emissions.														
Comments	-														

Data / Parameter	$C_{BB_tree,post,i}$														
Data unit	t CO ₂ e.ha ⁻¹														
Description	Post-deforestation carbon stock in belowground non-tree biomass in stratum i.														
Source of data	Secondary data from peer-reviewed literature (Silva Neto et al., 2012).														
Value applied:	See the values applied in table 16. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table border="1"> <thead> <tr> <th>Stratum (i)</th><th>$C_{BB_tree,post,i}$</th></tr> </thead> <tbody> <tr><td>As</td><td>0.02</td></tr> <tr><td>Ds</td><td>0.02</td></tr> <tr><td>Aa</td><td>0.02</td></tr> <tr><td>Ab</td><td>0.02</td></tr> <tr><td>D</td><td>0.02</td></tr> <tr><td>Db</td><td>0.02</td></tr> </tbody> </table>	Stratum (i)	$C_{BB_tree,post,i}$	As	0.02	Ds	0.02	Aa	0.02	Ab	0.02	D	0.02	Db	0.02
Stratum (i)	$C_{BB_tree,post,i}$														
As	0.02														
Ds	0.02														
Aa	0.02														
Ab	0.02														
D	0.02														
Db	0.02														
Justification of choice of data or description of measurement methods and procedures applied	-														
Purpose of Data	Calculation of baseline emissions														
Comments	-														

Data / Parameter	$C_{AB_non-tree,post,i}$												
Data unit	t CO ₂ e.ha ⁻¹												
Description	Post-deforestation carbon stock in aboveground non-tree biomass in stratum i.												
Source of data	Secondary data from peer-reviewed literature (Silva Neto et al., 2012).												
Value applied:	See the values applied in table 17. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table border="1"> <thead> <tr> <th>Stratum (i)</th><th>$C_{AB_non-tree,post,i}$</th></tr> </thead> <tbody> <tr><td>As</td><td>15.00</td></tr> <tr><td>Ds</td><td>15.00</td></tr> <tr><td>Aa</td><td>15.00</td></tr> <tr><td>Ab</td><td>15.00</td></tr> <tr><td>D</td><td>15.00</td></tr> </tbody> </table>	Stratum (i)	$C_{AB_non-tree,post,i}$	As	15.00	Ds	15.00	Aa	15.00	Ab	15.00	D	15.00
Stratum (i)	$C_{AB_non-tree,post,i}$												
As	15.00												
Ds	15.00												
Aa	15.00												
Ab	15.00												
D	15.00												

		Db	15.00	
Justification of choice of data or description of measurement methods and procedures applied	-			
Purpose of Data	Calculation of baseline emissions.			
Comments				

Data / Parameter	C _{BB_non-tree,post,i}															
Data unit	t CO ₂ e.ha ⁻¹															
Description	Post-deforestation carbon stock in belowground non-tree biomass in stratum i.															
Source of data	Secondary data from peer-reviewed literature (Silva Neto et al., 2012).															
Value applied:	See the values applied in table 18. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE) <table><tr><th>Stratum (i)</th><th>C_{BB_non-tree,post,i}</th></tr><tr><td>As</td><td>3.00</td></tr><tr><td>Ds</td><td>3.00</td></tr><tr><td>Aa</td><td>3.00</td></tr><tr><td>Ab</td><td>3.00</td></tr><tr><td>D</td><td>3.00</td></tr><tr><td>Db</td><td>3.00</td></tr></table>		Stratum (i)	C _{BB_non-tree,post,i}	As	3.00	Ds	3.00	Aa	3.00	Ab	3.00	D	3.00	Db	3.00
Stratum (i)	C _{BB_non-tree,post,i}															
As	3.00															
Ds	3.00															
Aa	3.00															
Ab	3.00															
D	3.00															
Db	3.00															
Justification of choice of data or description of measurement methods and procedures applied	-															
Purpose of Data	Calculation of baseline emissions															
Comments	-															

Data / Parameter	$C_{DW,post,i}$			
Data unit	t CO ₂ e.ha ⁻¹			
Description	Post-deforestation carbon stock in dead wood in stratum i.			
Source of data	-			
Value applied:		Stratum (i)	$C_{DW,post,i}$	
		As	-	

		Ds	-	
		Aa	-	
		Ab	-	
		D	-	
		Db	-	
Justification of choice of data or description of measurement methods and procedures applied	-			
Purpose of Data	Calculation of baseline emissions			
Comments	-			

Data / Parameter	$C_{LI,post,i}$			
Data unit	t CO ₂ e.ha ⁻¹			
Description	Post-deforestation carbon stock in litter in stratum i.			
Source of data	-			
Value applied:		Stratum (i)	$C_{LI,post,i}$	
		As	-	
		Ds	-	
		Aa	-	
		Ab	-	
		D	-	
		Db	-	
Justification of choice of data or description of measurement methods and procedures applied	-			
Purpose of Data	Calculation of baseline emissions			
Comments	-			

Data / Parameter	$C_{SOC,PD-BSL,i}$
Data unit	t CO ₂ -e ha ⁻¹
Description	Mean post-deforestation stock in soil organic carbon in the post deforestation stratum i.

Source of data	See the values applied in the table 21. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).																
	<table> <tr> <th>Stratum (i)</th><th>$C_{SOC,PD-BSL,i}$</th></tr> <tr> <td>As</td><td>104.25</td></tr> <tr> <td>Ds</td><td>121.21</td></tr> <tr> <td>Aa</td><td>104.25</td></tr> <tr> <td>Ab</td><td>121.21</td></tr> <tr> <td>D</td><td>164.05</td></tr> <tr> <td>Ap</td><td>164.05</td></tr> <tr> <td>Db</td><td>104.25</td></tr> </table>	Stratum (i)	$C_{SOC,PD-BSL,i}$	As	104.25	Ds	121.21	Aa	104.25	Ab	121.21	D	164.05	Ap	164.05	Db	104.25
Stratum (i)	$C_{SOC,PD-BSL,i}$																
As	104.25																
Ds	121.21																
Aa	104.25																
Ab	121.21																
D	164.05																
Ap	164.05																
Db	104.25																
Value applied:	Calculated based on VMD0004 v1.0, equation 3.																
Justification of choice of data or description of measurement methods and procedures applied	Calculated from mean carbon stock in soil organic carbon for stratum i ($C_{SOC,i,t}=0$), land use factor before conversion (FLU), management factor before conversion (FMG) and input factor before, according to VMD0004 v1.0, equation 3.																
Purpose of Data	Calculation of baseline emissions.																
Comments	-																

Data / Parameter	$GHG_{BSL-E,i,t}$
Data unit	t CO ₂ e.yr-1
Description	Greenhouse gas emissions as a result of deforestation activities within the project boundary in the baseline stratum i in year t.
Source of data	Calculated based on VMD0006 v1.3 equation 15.
Value applied:	The table has been omitted due to its size. See the values applied in the table 24. (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Justification of choice of data or description of measurement methods and procedures applied	Calculated based on the non-CO ₂ emissions due to biomass burning in stratum i in year t ($EBiomassBurn,i,t$), according to VMD0006 v1.3 equation 15.
Purpose of Data	Calculation of baseline emissions.
Comments	Net CO ₂ e emission from fossil fuel combustion in stratum i in year t (EFC,i,t) and direct N ₂ O emission as a result of nitrogen application on the alternative land use within the project boundary in stratum i in year t ($N2Odirect-N,i,t$) are

	conservatively excluded from the project scope and the calculation of the baseline estimates following VM0007 v1.6 section 5.4 criteria.
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Data / Parameter	$E_{\text{BiomassBurn},i,t}$
Data unit	t CO ₂ e
Description	Greenhouse gas emissions due to biomass burning in stratum i in year t of each GHG (CO ₂ , CH ₄ , N ₂ O).
Source of data	Calculated based on VMD0013 v1.3 equation 1.
Value applied:	The table has been omitted due to its size. Please refer to the values listed in 8. Planned GHG emissions - BSL- Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE.
Justification of choice of data or description of measurement methods and procedures applied	Calculated based on area burnt for stratum i in year t ($A_{\text{burn},i,t}$), average aboveground biomass stock before burning stratum i, in year t ($B_{i,t}$), combustion factor for stratum i (unitless) (COMF_i), emission factor for stratum i for gas g (Gg,i) and the Global warming potential for gas g (GWP_g), according to VMD0013 v1.3 equation 1. .
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	$A_{\text{burn},i,t}$
Data unit	Ha
Description	Area burnt for stratum i in year t.
Source of data	Equal to $AA_{\text{planned},i,t}$ in the baseline case.
Value applied:	The table has been omitted due to its size. Please refer to the values listed in table 24 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE.
Justification of choice of data or description of measurement methods and procedures applied	For the calculation of baseline emissions, the burned area is considered equivalent to the annual deforested area, assuming that all deforestation is preceded by a fire to clear the land in the baseline case.
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	$B_{i,t}$
Data unit	tonnes d.m. ha ⁻¹
Description	Average aboveground biomass stock before burning for stratum i, year t.
Source of data	Calculated based on VMD0013 v1.3 equation 2.
Value applied:	The table has been omitted due to its size. Please see the values applied in 7. Biomass before burning - BSL (see Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Justification of choice of data or description of measurement methods and procedures applied	Calculated based on carbon stock in aboveground biomass in trees in stratum i in year t ($C_{AB_tree,i,t}$), Carbon stock in dead wood for stratum i in year t ($C_{DW,i,t}$), Carbon stock in litter for stratum i in year t ($C_{L,i,t}$) and Carbon fraction of biomass (CF), according to VMD0013 v1.3 equation 2.
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	$COMF_i$
Data unit	Dimensionless
Description	Combustion factor for stratum i .
Source of data	IPCC (2006), Volume 4, Chapter 2, "Generic Methodologies Applicable to Multiple Land-use Categories"
Value applied:	0.45
Justification of choice of data or description of measurement methods and procedures applied	Default values in Annex 3A.1, Table 3A.1.12 of IPCC "Good Practice Guidance for LULUCF", 2003.
Purpose of Data	Calculation of baseline emissions.
Comments	The combustion factor is a measure of the proportion of the fuel that is actually combusted, which varies as a function of the size and architecture of the fuel load (i.e., a smaller proportion of large, coarse fuel such as tree stems will be burnt compared to fine fuels, such as grass leaves), the moisture content of the fuel and the type of fire (i.e., intensity and rate of spread).

Data / Parameter	$G_{g,i}$
Data unit	kg t ⁻¹ d.m. burnt
Description	Emission factor for stratum i for gas g
Source of data	IPCC (2006), Volume 4, Chapter 2, "Generic Methodologies Applicable to Multiple Land-use Categories"
Value applied:	CH ₄ =6.8; N ₂ O=0.2
Justification of choice of data or description of measurement methods and procedures applied	Default values in Table 2.5 of IPCC, 2006
Purpose of Data	Calculation of baseline emissions.
Comments	Defaults can be found in Volume 4, Chapter 2, of the IPCC 2006 Inventory Guidelines in table 2.5 (see Appendix II – Calculus Table: emission factors for various types of burning for CH ₄ and N ₂ O).

Data / Parameter	GWP_g
Data unit	Dimensionless
Description	Global warming potential for gas g.
Source of data	Fifth Assessment Report (AR5) IPCC (2006)
Value applied:	CH ₄ =28; N ₂ O=265
Justification of choice of data or description of measurement methods and procedures applied	Default factor from Fifth Assessment Report (AR5) IPCC (2006). Synthesis Report page 87.
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	$\Delta C_{BSL,i,t}$
Data unit	t CO ₂ e

Description	Net carbon stock changes in all pools in the baseline stratum i in year t.
Source of data	Calculated based on VMD0006 v1.3 equation 13.
Value applied:	The table has been omitted due to its size. Please refer to the values listed in table 45 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE.
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on the annual area of baseline planned deforestation for stratum i in year t ($AA_{planned,i,t}$), the baseline carbon stock change in aboveground tree biomass in stratum I ($\Delta C_{AB_tree,i}$), the baseline carbon stock change in belowground tree biomass in stratum I ($\Delta C_{BB_tree,i}$), the baseline carbon stock change in aboveground non-tree biomass in stratum I ($\Delta C_{AB_non-tree,i}$), the baseline carbon stock change in belowground non-tree biomass in stratum I ($\Delta C_{BB_non-tree,i}$), the baseline carbon stock change in wood products in stratum I ($\Delta C_{WP,i}$), the baseline carbon stock change in dead wood in stratum I ($\Delta C_{DW,i}$), the baseline carbon stock change in litter in stratum I ($\Delta C_{LI,i}$) and the baseline carbon stock change in soil organic carbon in stratum I, according to VMD0006 v1.3 equation .
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	$\Delta C_{BSL,planned}$
Data unit	t CO ₂ e
Description	Net greenhouse gas emissions in the baseline from planned deforestation.
Source of data	Calculated based on VMD0006 v1.3 equation 1.
Value applied:	21,600,330. See the Table 25 Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE.
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on the net carbon stock changes in all pools in the baseline ($\Delta C_{BSL,i,t}$) and GHG emissions as a result of deforestation activities within the project boundary in the baseline stratum i in year t ($GHG_{BSL-E,i,t}$), according to equation 1 from VMD0006 v1.3.
Purpose of Data	Calculation of baseline emissions.
Comments	-

3.1.2 Data and Parameters Monitored

Data / Parameter	$A_{DefPA,i,u,t}$														
Data unit	Ha														
Description	Area of recorded deforestation in the project area in stratum I converted to land use u in year t.														
Source of data	Remote sensing imagery (Sentinel 2, Landsat 8), PRODES and DETER database.														
Description of measurement methods and procedures applied	Annual deforestation is measured in GIS using remote sensing techniques and reported with spatial explicit data by raster and shapefile. evidence.														
Frequency of monitoring/recording	Annual														
Value applied:	<table border="1"> <thead> <tr> <th>Stratum (i)</th><th>$A_{DefPA,i,u,t}$</th></tr> </thead> <tbody> <tr> <td>As</td><td>0</td></tr> <tr> <td>Ds</td><td>0</td></tr> <tr> <td>Aa</td><td>93.33</td></tr> <tr> <td>Ab</td><td>85.55</td></tr> <tr> <td>D</td><td>0</td></tr> <tr> <td>Db</td><td>0</td></tr> </tbody> </table> Data from: Table 49 - Appendix II – Calculus tables – 01 INTEGRATED CALCULUS TABLE.	Stratum (i)	$A_{DefPA,i,u,t}$	As	0	Ds	0	Aa	93.33	Ab	85.55	D	0	Db	0
Stratum (i)	$A_{DefPA,i,u,t}$														
As	0														
Ds	0														
Aa	93.33														
Ab	85.55														
D	0														
Db	0														
Monitoring equipment	Landsat 8 OLI, Sentinel MSI														
QA/QC procedures applied	Accuracy assessment of PRODES classification was performed by comparing each class of the land cover map from the reference period (2011 to 2021 - Acre and 2012 to 2022 - Para) with a set of 200 points randomly distributed over the reference region for each year. The reference data used for this step comes from the visual interpretation of high spatial resolution images available in Google Earth. The global accuracy of the mapping for the different classes of land cover presented values above 95% for all three classes in each year analyzed. The overall accuracy of the forest cover reference map (2020) was 95.5%. In 2022, satellite images were used to validate the APD areas. Landsat 8 was used for 10 years before the start of the project and Sentinel 2 for the start date. An algorithm based on machine learning (Random Forest) was used for the classification of the images, the methodological details and accuracy of which are														

	presented by PAI in Forest_Class_Validation_2022 of Appendix X_GIS data.
Purpose of data	Calculation of project emissions
Calculation method	Classified images with information about the area of annual deforestation in Brazil are downloaded from PRODES websites and clipped with the project area spatial limits. Images from Sentinel are downloaded from ESA.
Comments	-

Data / Parameter	$C_{P,post,u,i}$																	
Data unit	t CO ₂ -e																	
Description	Carbon stock in all pools in post-deforestation land use u in stratum i.																	
Source of data	Calculated according to VMD0015 v2.2, equation 06																	
Description of measurement methods and procedures applied	Calculated based on carbon stock in aboveground tree biomass in stratum I ($C_{AB_tree,i}$), carbon stock in belowground tree biomass in stratum I ($C_{BB_tree,i}$), carbon stock in aboveground non-tree vegetation in stratum ($C_{AB_non-tree,i}$), carbon stock in belowground non-tree vegetation in stratum I ($C_{BB_non-tree,i}$), carbon stock in dead wood in stratum I ($C_{DW,i}$), carbon stock in litter in stratum I (CLI,i), mean post-deforestation stock in soil organic carbon in the post deforestation stratum I ($C_{SOC,PD-BSL,i}$), according to VMD0015 v2.2, equation 06.																	
Frequency of monitoring/recording	10 years (in each baseline revalidation)																	
Value applied:		<table><tr><th>Stratum (i)</th><th>$C_{P,post,u,i}$</th></tr><tr><td>As</td><td>122.38</td></tr><tr><td>Ds</td><td>139.34</td></tr><tr><td>Aa</td><td>122.38</td></tr><tr><td>Ab</td><td>139.34</td></tr><tr><td>Db</td><td>122.38</td></tr><tr><td>D</td><td>182.17</td></tr></table>	Stratum (i)	$C_{P,post,u,i}$	As	122.38	Ds	139.34	Aa	122.38	Ab	139.34	Db	122.38	D	182.17		
Stratum (i)	$C_{P,post,u,i}$																	
As	122.38																	
Ds	139.34																	
Aa	122.38																	
Ab	139.34																	
Db	122.38																	
D	182.17																	
Monitoring equipment	N/A																	
QA/QC procedures applied	-																	
Purpose of data	Calculation of project emissions																	
Calculation method	See VMD0015 v2.2, equation 05.																	

Comments	-
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Data / Parameter	$C_{WP,i}$
Data unit	t CO ₂ -e ha ⁻¹
Description	Carbon stock sequestered in wood products from harvests in stratum i
Source of data	Post exploratory reports
Description of measurement methods and procedures applied	See section 4.1.2.8.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions
Calculation method	See VMD0005 v1.2, equation 05.
Comments	

Data / Parameter	$\Delta C_{pools,Def,u,i,t}$
Data unit	t CO ₂ -e
Description	Net carbon stock changes in all pools as a result of deforestation in the project case in land use u in stratum i at time t.
Source of data	Calculated according to VMD0015 v2.2, equation 05.
Description of measurement methods and procedures applied	Calculated based on carbon stock in all pools in the baseline case in stratum I ($C_{BSL,i}$), carbon stock in all pools in post-deforestation land use u in stratum I ($C_{P,post,u,i}$) and carbon stock sequestered in wood products from harvests in stratum I ($C_{WP,i}$), according to VMD0015 v2.2, equation 05.
Frequency of monitoring/recording	10 years (in each baseline revalidation)

Value applied:		Stratum (i)	$\Delta C_{\text{pools,Def,u,i,t}}$	
		As	567.15	
		Ds	598.89	
		Aa	475.99	
		Ab	492.85	
		Db	655.18	
		D	764.71	
Monitoring equipment	N/A			
QA/QC procedures applied	-			
Purpose of data	Calculation of project emissions			
Calculation method	See VMD0015 v2.2, equation 05.			
Comments	-			

Data / Parameter	$\Delta C_{P,\text{DefPA},i,t}$
Data unit	t CO ₂ -e
Description	Net carbon stock change as a result of deforestation in the project case in the project area in stratum i at time t.
Source of data	Calculated according to VMD0015 v2.2, equation 03
Description of measurement methods and procedures applied	Calculated based on the area of recorded deforestation in the project area stratum i converted to land use u at time t ($A_{\text{DefPA},u,i,t}$) and the net carbon stock changes in all pools in the project case in land use u in stratum i at time t ($\Delta C_{\text{pools,Def,u,i,t}}$), according to VMD0015 v2.2, equation 03.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.

Value applied:	<table><tr><th>Instance</th><th>Stratum (i)</th><th>$\Delta C_{P,DefPA,i,t}$</th></tr><tr><td rowspan="2">PAI #1</td><td>As</td><td>-</td></tr><tr><td>Ds</td><td>-</td></tr><tr><td rowspan="2">PAI #2</td><td>Aa</td><td>3,427.13</td></tr><tr><td>Ab</td><td>24.64</td></tr><tr><td rowspan="2">PAI #3</td><td>Aa</td><td>13,251.55</td></tr><tr><td>Ab</td><td>-</td></tr><tr><td rowspan="2">PAI #4</td><td>Aa</td><td>15,046.03</td></tr><tr><td>Ab</td><td>42,138.79</td></tr><tr><td rowspan="2">PAI #5</td><td>Aa</td><td>12,699.40</td></tr><tr><td>Ab</td><td>-</td></tr><tr><td>PAI #6</td><td>Db</td><td>-</td></tr><tr><td>PAI #7</td><td>D</td><td>-</td></tr><tr><td>PAI #8</td><td>D</td><td>-</td></tr><tr><td>PAI #9</td><td>D</td><td>-</td></tr></table>	Instance	Stratum (i)	$\Delta C_{P,DefPA,i,t}$	PAI #1	As	-	Ds	-	PAI #2	Aa	3,427.13	Ab	24.64	PAI #3	Aa	13,251.55	Ab	-	PAI #4	Aa	15,046.03	Ab	42,138.79	PAI #5	Aa	12,699.40	Ab	-	PAI #6	Db	-	PAI #7	D	-	PAI #8	D	-	PAI #9	D	-
	Instance	Stratum (i)	$\Delta C_{P,DefPA,i,t}$																																						
	PAI #1	As	-																																						
		Ds	-																																						
	PAI #2	Aa	3,427.13																																						
		Ab	24.64																																						
	PAI #3	Aa	13,251.55																																						
		Ab	-																																						
	PAI #4	Aa	15,046.03																																						
		Ab	42,138.79																																						
	PAI #5	Aa	12,699.40																																						
		Ab	-																																						
	PAI #6	Db	-																																						
	PAI #7	D	-																																						
	PAI #8	D	-																																						
PAI #9	D	-																																							
Data from: Table 50 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE.																																									
Monitoring equipment	-																																								
QA/QC procedures applied	-																																								
Purpose of data	Calculation of project emissions																																								
Calculation method	See VMD0015 v2.2, equation 03.																																								
Comments	-																																								

Data / Parameter	$A_{DegW,i}$			
Data unit	ha			
Description	Area potentially impacted by degradation processes in stratum i			
Source of data	Measured			
Description of measurement methods and procedures applied	The area subject to degradation is delineated based on an access buffer from all access points, such as roads and rivers or previously cleared areas, to the project area, with a width equal to the distance of degradation penetration.			
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.			
Value applied:		Instance	Stratum (i)	$A_{DegW,i}$
		PAI #1	As	-

			Ds	-
	PAI #2	Aa	410.69	
		Ab	167.51	
	PAI #3	Aa	387.27	
		Ab	36.51	
	PAI #4	Aa	449.22	
		Ab	676.84	
	PAI #5	Aa	649.74	
		Ab	30.21	
	PAI #6	Db	-	
	PAI #7	D	-	
	PAI #8	D	-	
PAI #9	D	-		
Data from: Table 52 - Appendix II – Calculus tables – 01 INTEGRATED CALCULUS TABLE.				
Monitoring equipment	DETER data, Remote Sensing data (Sentinel), GIS software’s and field survey.			
QA/QC procedures applied	Orbital imaging steps will be supervised by a professional with more than ten years of experience remote sensing in tropical forests. In addition, field survey will be adopted to effect and guarantee quality imaging at extremely high spatial resolution. All Digital Image Processing (PDI) steps will be internally rechecked. The orbital imaging results will be compared with data collected in the field for validation, where such quality assurance and control procedures will be led by forest inventory specialists from the BRC team (see Appendix IV - Carbon Pools).			
Purpose of data	Calculation of project emissions			
Calculation method	See VMD0015 v2.2, equation 08.			
Comments	Ex-ante estimates of net carbon stock changes as a result of degradation in stratum i in the project area in year t ($\Delta C_{P,DegW,i,t}$) were made based on participatory rural appraisals (PRA), though the number of families and the average consumption of wood.			

Data / Parameter	$C_{DegW,i,t}$
Data unit	t CO ₂ -e.ha ⁻¹
Description	Biomass carbon of trees cut and removed through degradation process from plots measured in stratum i in year t.
Source of data	Estimated through diameter of stumps directly measured in the field.

Description of measurement methods and procedures applied	The diameter of all tree stumps is measured and conservatively assumed to be the same as the DBH. The above and below ground carbon stock of each harvested tree are estimated using the same allometric regression equation and root to shoot ratio used for estimating the carbon pool in trees in the baseline scenario																																										
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.																																										
Value applied:		<table><thead><tr><th>Instance</th><th>Stratum (i)</th><th>C_{DegW,i,t}</th></tr></thead><tbody><tr><td rowspan="2">PAI #1</td><td>As</td><td>-</td></tr><tr><td>Ds</td><td>-</td></tr><tr><td rowspan="2">PAI #2</td><td>Aa</td><td>90.67</td></tr><tr><td>Ab</td><td>90.67</td></tr><tr><td rowspan="2">PAI #3</td><td>Aa</td><td>4.02</td></tr><tr><td>Ab</td><td>4.02</td></tr><tr><td rowspan="2">PAI #4</td><td>Aa</td><td>48.55</td></tr><tr><td>Ab</td><td>-</td></tr><tr><td rowspan="2">PAI #5</td><td>Aa</td><td>48.55</td></tr><tr><td>Ab</td><td>-</td></tr><tr><td>PAI #6</td><td>Db</td><td>-</td></tr><tr><td>PAI #7</td><td>D</td><td>-</td></tr><tr><td>PAI #8</td><td>D</td><td>-</td></tr><tr><td>PAI #9</td><td>D</td><td>-</td></tr></tbody></table>	Instance	Stratum (i)	C _{DegW,i,t}	PAI #1	As	-	Ds	-	PAI #2	Aa	90.67	Ab	90.67	PAI #3	Aa	4.02	Ab	4.02	PAI #4	Aa	48.55	Ab	-	PAI #5	Aa	48.55	Ab	-	PAI #6	Db	-	PAI #7	D	-	PAI #8	D	-	PAI #9	D	-	
Instance	Stratum (i)	C _{DegW,i,t}																																									
PAI #1	As	-																																									
	Ds	-																																									
PAI #2	Aa	90.67																																									
	Ab	90.67																																									
PAI #3	Aa	4.02																																									
	Ab	4.02																																									
PAI #4	Aa	48.55																																									
	Ab	-																																									
PAI #5	Aa	48.55																																									
	Ab	-																																									
PAI #6	Db	-																																									
PAI #7	D	-																																									
PAI #8	D	-																																									
PAI #9	D	-																																									
	Data from: Table 53 - Appendix II – Calculus tables – 01 INTEGRATED CALCULUS TABLE.																																										
Monitoring equipment	Diameter tape.																																										
QA/QC procedures applied	See SOP for biomass inventory (Appendix IV - Carbon Pools).																																										
Purpose of data	Calculation of project emissions.																																										
Calculation method	Calculated through allometric equation used for estimating the carbon pool in trees in the baseline scenario.																																										
Comments	Ex-ante estimates were made based on PRAs, which considered the amount of wood used for firewood, construction of houses and boats per family.																																										

Data / Parameter	AP _i
Data unit	ha
Description	Total area of degradation sample plots in stratum i.
Source of data	Ground measurement.

Description of measurement methods and procedures applied	Sampling plots covering 3% of A_{degWi}																				
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.																				
Value applied:	Values obtained from "27. MR2 - Final data" spreadsheets (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). <table> <tr> <th>Instance</th><th>Api (ha)</th></tr> <tr> <td>PAI #1</td><td>-</td></tr> <tr> <td>PAI #2</td><td>3.8</td></tr> <tr> <td>PAI #3</td><td>11.74</td></tr> <tr> <td>PAI #4</td><td>15.75</td></tr> <tr> <td>PAI #5</td><td>16.43</td></tr> <tr> <td>PAI #6</td><td>-</td></tr> <tr> <td>PAI #7</td><td>-</td></tr> <tr> <td>PAI #8</td><td>-</td></tr> <tr> <td>PAI #9</td><td>-</td></tr> </table>	Instance	Api (ha)	PAI #1	-	PAI #2	3.8	PAI #3	11.74	PAI #4	15.75	PAI #5	16.43	PAI #6	-	PAI #7	-	PAI #8	-	PAI #9	-
Instance	Api (ha)																				
PAI #1	-																				
PAI #2	3.8																				
PAI #3	11.74																				
PAI #4	15.75																				
PAI #5	16.43																				
PAI #6	-																				
PAI #7	-																				
PAI #8	-																				
PAI #9	-																				
Monitoring equipment	Tape measure, GPS.																				
QA/QC procedures applied	See SOP for biomass inventory (Appendix IV - Carbon Pools).																				
Purpose of data	Calculation of project emissions.																				
Calculation method	Fixed area plots covering 3% of the $A_{DegW,i}$ in the monitoring period.																				
Comments	-																				

Data / Parameter	$\Delta C_{P,DegW,i,t}$
Data unit	t CO ₂ -e
Description	Net carbon stock changes as a result of degradation in stratum i in the project area in year t.
Source of data	Calculated according to VMD0015 v2.2, equation 08.
Description of measurement methods and procedures applied	Calculated based on area potentially impacted by degradation processes in stratum I ($A_{DegW,i}$) and biomass carbon of trees cut and removed through degradation process from plots measured in stratum i in year t ($C_{DegW,i,t}$) and total area of degradation sample plots in stratum I (AP_i), according to VMD0015 v2.2, equation 08.
Frequency of monitoring/recording	Annual

Value applied:	<table border="1"> <thead> <tr> <th>Instance</th><th>$\Delta C_{P,DegW,i,t}$</th></tr> </thead> <tbody> <tr><td>PAI #1</td><td>-</td></tr> <tr><td>PAI #2</td><td>13,796.26</td></tr> <tr><td>PAI #3</td><td>145.10</td></tr> <tr><td>PAI #4</td><td>1,384.42</td></tr> <tr><td>PAI #5</td><td>1,918.97</td></tr> <tr><td>PAI #6</td><td>-</td></tr> <tr><td>PAI #7</td><td>-</td></tr> <tr><td>PAI #8</td><td>-</td></tr> <tr><td>PAI #9</td><td>-</td></tr> <tr><td>Total</td><td>17,245</td></tr> </tbody> </table> Data from: Table 54 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE.	Instance	$\Delta C_{P,DegW,i,t}$	PAI #1	-	PAI #2	13,796.26	PAI #3	145.10	PAI #4	1,384.42	PAI #5	1,918.97	PAI #6	-	PAI #7	-	PAI #8	-	PAI #9	-	Total	17,245
Instance	$\Delta C_{P,DegW,i,t}$																						
PAI #1	-																						
PAI #2	13,796.26																						
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PAI #5	1,918.97																						
PAI #6	-																						
PAI #7	-																						
PAI #8	-																						
PAI #9	-																						
Total	17,245																						
Monitoring equipment	N/A																						
QA/QC procedures applied	-																						
Purpose of data	Calculation of project emissions																						
Calculation method	See VMD0015 v2.2, equation 08.																						
Comments	-																						

Data / Parameter	$\Delta C_{P,SelLog,i,t}$
Data unit	t CO ₂ -e
Description	Net carbon stock change as a result of degradation through selective logging of FSC certified forest management areas in the project area in the project case in stratum i in year t.
Source of data	Calculated according to VMD0015 v2.2, equation 09.
Description of measurement methods and procedures applied	Calculated based on actual net project emissions arising in the logging gap in stratum i in year t ($C_{LG,i,t}$), actual net project emissions arising from logging infrastructure in stratum i in year t ($C_{LR,i,t}$) and the carbon stock in wood products pool from stratum i, in year t ($C_{WPI,t}$), according to VMD0015 v2.2, equation 09.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0

Monitoring equipment	N/A
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions
Calculation method	See section 4.2
Comments	-

Data / Parameter	$\Delta C_{P,Deg,i,t}$														
Data unit	t CO ₂ -e														
Description	Net carbon stock change as a result of degradation in the project area in the project case in stratum i in year t; t CO														
Source of data	Calculated according to VMD0015 v2.2, equation 01.														
Description of measurement methods and procedures applied	Calculated based on Net carbon stock change as a result of degradation through extraction of trees for illegal timber or fuelwood and charcoal i n the project area in the project case in stratum i in year t ($\Delta C_{P,DegW,i,t}$), Net carbon stock change as a result of degradation through selective logging of FSC certified forest management areas in the project area in the project case in stratum i in year t ($\Delta C_{P,SelLog,i,t}$), according to VMD0015 v2.2, equation 01.														
Frequency of monitoring/recording	Annual														
Value applied:	<table border="1"> <thead> <tr> <th>Stratum</th><th>$\Delta C_{P,Deg,i,t}$</th></tr> </thead> <tbody> <tr> <td>Aa</td><td>13,235</td></tr> <tr> <td>Ab</td><td>4,009</td></tr> <tr> <td>As</td><td>-</td></tr> <tr> <td>D</td><td>-</td></tr> <tr> <td>Db</td><td>-</td></tr> <tr> <td>Ds</td><td>-</td></tr> </tbody> </table> Data from: Table 51 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE.	Stratum	$\Delta C_{P,Deg,i,t}$	Aa	13,235	Ab	4,009	As	-	D	-	Db	-	Ds	-
Stratum	$\Delta C_{P,Deg,i,t}$														
Aa	13,235														
Ab	4,009														
As	-														
D	-														
Db	-														
Ds	-														
Monitoring equipment	N/A														
QA/QC procedures applied	-														
Purpose of data	Calculation of project emissions														
Calculation method	See section 4.2														

Comments	-
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Data / Parameter	$\Delta C_{P,Enh,i,t}$
Data unit	t CO ₂ -e
Description	Net carbon stock change as a result of forest growth and sequestration during the project in areas projected to be deforested in the baseline2 in stratum i in year t; t CO ₂ -e.
Source of data	Calculated according to VMD0015 v2.2, step 02;
Description of measurement methods and procedures applied	Calculated from ground measurements to monitor the change in carbon stocks through time as given in the carbon pool modules. If any of the strata identified as accumulating carbon are subject to degrading activities, the emissions from these activities will be estimated and deducted from the amount estimated to be sequestered in the accumulation areas to generate a net estimation of carbon sequestration or emission.
Frequency of monitoring/recording	Annual
Value applied:	Carbon stock enhancement is conservatively assumed to be zero in all strata, following VMD0015 v2.2, step 02.
Monitoring equipment	N/A
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions
Calculation method	See section 4.2
Comments	-

Data / Parameter	$C_{LG,i,t}$
Data unit	t CO ₂ -e
Description	Actual net project emissions arising in the logging gap, in stratum i in year t;
Source of data	Calculated according to VMD0015 v2.2, equation 10
Description of measurement methods and procedures applied	Calculated based on biomass carbon stock of timber extracted within the project boundary for logging stratum z, in stratum i in year t ($C_{EXT, z,i,t}$), logging damage factor for logging

	stratum z, in stratum I ($L_{DFz,i}$) and volume extracted from logging stratum z, in stratum i in year t ($V_{EXT,z,i,t}$), according to VMD0015 v2.2, equation 10.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	N/A
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	See VMD0015 v2.2, equation 10 at section 4.2.
Comments	-

Data / Parameter	$C_{EXT,z,i,t}$
Data unit	t CO ₂ -e
Description	Biomass carbon stock of timber extracted within the project boundary for logging stratum z, in stratum i in year t.
Source of data	Calculated according to VMD0015 v2.2, equation 11.
Description of measurement methods and procedures applied	Calculated based on the volume of timber extracted of species j for logging stratum z, in stratum i in year t ($V_{EXT,j,z,i,t}$), the basic wood density of species j (D_j) and the carbon fraction of biomass (CF), according to VMD0015 v2.2, equation 11.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	N/A
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	The volume of timber extracted of all species is taken from annual operating plan. Basic wood density of all species is taken from the tropical wood density database (Annex 12). Carbon fraction of biomass for tree species is default according

	to IPCC (2006). See VMD0015 v2.2, equation 11 at section 4.2.
Comments	-

Data / Parameter	$LDF_{z,i}$
Data unit	t C m ⁻³
Description	Logging damage factor for logging stratum z, in stratum i
Source of data	VMD0015 v2.2
Description of measurement methods and procedures applied	Default data
Frequency of monitoring/recording	-
Value applied:	0.67
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	-
Comments	-

Data / Parameter	$V_{EXT,z,i,t}$
Data unit	m ³
Description	Volume extracted from logging stratum z, in stratum i in year t.
Source of data	Post exploration reports.
Description of measurement methods and procedures applied	-
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 117,046 m ³ Ex-post: 117,046 m ³ in 2022 (table 37 of Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	-
Comments	-

Data / Parameter	$C_{LR,i,t}$
Data unit	t CO ₂ -e
Description	Actual net project emissions arising from logging infrastructure in stratum i in year t.
Source of data	Calculated according to VMD0015 v2.2, equation 12.
Description of measurement methods and procedures applied	Calculated based on change in carbon stock resulting from skid trail creation in stratum i in year t ($\Delta C_{SKID,i,t}$), Change in carbon stock resulting from logging road creation in stratum i in year t ($\Delta C_{ROAD,i,t}$) and the Change in carbon stock resulting from logging deck creation in stratum i in year t ($\Delta C_{DECKS,i,t}$), according to VMD0015 v2.2, equation 12
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	N/A
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	See VMD0015 v2.2, equation 12 at section 4.2.
Comments	-

Data / Parameter	$\Delta C_{SKID,i,t}$
Data unit	t CO ₂ -e
Description	Change in carbon stock resulting from skid trail creation in stratum i in year t.

Source of data	Calculated according to VMD0015 v2.2, equation 13.
Description of measurement methods and procedures applied	Calculated based on the Length of skid trails in stratum i in year t ($L_{SKID,i,t}$) and the Skid trail emissions factor (Average emissions resulting from dead wood created in the process of skid trail creation per length of skid trail) in stratum I (SK_i), based on VMD0015 v2.2, equation 13.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	N/A
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions
Calculation method	The length of skid trails is taken from forest exploration maps. These maps contain information about all felled trees, primary, secondary and skid trails. Skid trail emissions factor is calculated according to VMD0015 v2.2, equations 14. See VMD0015 v2.2, equation 13 and 14 at section 4.2.
Comments	-

Data / Parameter	$L_{SKID,i,t}$
Data unit	m
Description	Length of skid trails in stratum i in year t.
Source of data	Forest exploration maps and associated GIS files.
Description of measurement methods and procedures applied	Measured in GIS.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	N/A
QA/QC procedures applied	-

Purpose of data	Calculation of project emissions.
Calculation method	-
Comments	Forest exploration maps contain information about all felled trees, primary and secondary roads, and skid trails.

Data / Parameter	SK_i
Data unit	t CO ₂ -e.m ⁻¹
Description	Skid trail emission factor (Average emissions resulting from dead wood created in the process of skid trail creation per length of skid trail) in stratum i.
Source of data	Calculated according to VMD0015 v2.2, equation 14
Description of measurement methods and procedures applied	Calculated based on mean live carbon stock of trees and non-tree biomass assumed to be killed per unit area in creation of skid trail in stratum I ($C_{dest,i}$), the carbon stock change in organic carbon resulting from skid trail creation in stratum I ($\Delta C_{SOC_sk,i}$) and the Mean width of skid trails in stratum I (W_{SKID}) according to VMD0015 v2.2, equation 14.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	-
QA/QC procedures applied	N/A
Purpose of data	Calculation of project emissions
Calculation method	-
Comments	Mean live carbon stock of trees and non-tree biomass assumed to be killed is calculated taking in consideration the average carbon stock of trees below the maximum diameter tree that can be within the path of a skid trail, following VMD0015 v2.2, step 02 criteria, and equation 15. Mean width of skid trails is determined in function of the machinery used at the project site. This value will vary among PAIs. See VMD0015 v2.2, equation 14 and 15 at section 4.2.

Data / Parameter	$C_{dest,i}$
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Data unit	t CO ₂ -
Description	Mean live carbon stock of trees and non-tree biomass assumed to be killed per unit area in creation of skid trail in stratum i.
Source of data	Calculated according to VMD0015 v2.2, equation 15.
Description of measurement methods and procedures applied	Calculated based on Carbon stock in aboveground tree biomass assumed to be killed per unit area resulting from the creation of the skid trail in stratum I (CAB_tree_dest,i), carbon stock in belowground tree biomass assumed to be killed per unit area resulting from the creation of the skid trail in stratum I (CBB_tree_dest,i), Carbon stock in aboveground non-tree biomass in stratum I (CAB_non-tree,i) and the Carbon stock in belowground non-tree biomass in stratum I (CBB_non-tree,i), based on VMD0015 v2.2, equation 15.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post:0
Monitoring equipment	N/A
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions
Calculation method	Mean live carbon stock of trees and non-tree biomass assumed to be killed is calculated taking in consideration the average carbon stock of trees below the maximum diameter tree that can be within the path of a skid trail, following VMD0015 v2.2, step 02 criteria, and equation 15. See VMD0015 v2.2, equation 14 and 15 at section 4.2.
Comments	-

Data / Parameter	$\Delta CSOC_{sk,i}$
Data unit	t CO ₂ -e
Description	Mean live carbon stock of trees and non-tree biomass assumed to be killed per unit area in creation of skid trail in stratum i.
Source of data	Calculated according to VMD0015 v2.2, equation 15.

Description of measurement methods and procedures applied	Calculated based on Carbon stock in aboveground tree biomass assumed to be killed per unit area resulting from the creation of the skid trail in stratum I ($C_{AB_tree_dest,i}$), carbon stock in belowground tree biomass assumed to be killed per unit area resulting from the creation of the skid trail in stratum I ($C_{BB_tree_dest,i}$), Carbon stock in aboveground non-tree biomass in stratum I ($C_{AB_non-tree,i}$) and the Carbon stock in belowground non-tree biomass in stratum I ($C_{BB_non-tree,i}$), based on VMD0015 v2.2, equation 15.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post:0
Monitoring equipment	N/A
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions
Calculation method	Mean live carbon stock of trees and non-tree biomass assumed to be killed is calculated taking in consideration the average carbon stock of trees below the maximum diameter tree that can be within the path of a skid trail, following VMD0015 v2.2, step 02 criteria, and equation 15. See VMD0015 v2.2, equation 14 and 15 at section 4.2.
Comments	-

Data / Parameter	W_{skid}
Data unit	m
Description	Mean width of skid trails in stratum i
Source of data	Based on the Skidder type model.
Description of measurement methods and procedures applied	Interview with the responsible for the forest management operations at the PAI.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	-

QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	-
Comments	-

Data / Parameter	$\Delta C_{SOC_sk,i}$
Data unit	t CO ₂ -e ha ⁻¹
Description	Carbon stock change in soil organic carbon resulting from skid trail creation in stratum i.
Source of data	Calculated according to VMD0015 v2.2, equation 09.
Description of measurement methods and procedures applied	Estimates are made based on Mean carbon stock in soil organic carbon for stratum i ($C_{SOC,i,t=0}$), Land use factor after conversion (FLU), Management factor after conversion (FMG), and Input factor after conversion (FI), according to VMD0015 v2.2, equation 09.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	Calculated according to VMD0015 v2.2, equation 09.
Comments	-

Data / Parameter	F_{LU}
Data unit	Dimensionless
Description	Land use factor after conversion.
Source of data	IPCC, (2006).
Description of measurement methods and procedures applied	Default value.

Frequency of monitoring/recording	-
Value applied:	Not applied
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	-
Comments	-

Data / Parameter	F_{MG}
Data unit	Dimensionless
Description	Management factor after conversion.
Source of data	IPCC, (2006).
Description of measurement methods and procedures applied	Default value.
Frequency of monitoring/recording	-
Value applied:	Not applied
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	-
Comments	-

Data / Parameter	F_I
Data unit	Dimensionless
Description	Input factor after conversion.
Source of data	IPCC, (2006).
Description of measurement methods and procedures applied	Default value.

Frequency of monitoring/recording	-
Value applied:	Not applied
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	-
Comments	-

Data / Parameter	$\Delta C_{ROAD,i,t}$
Data unit	t CO ₂ -e
Description	Change in carbon stock resulting from logging road creation in stratum i in year t
Source of data	Calculated according to VMD0015 v2.2, equation 17
Description of measurement methods and procedures applied	Calculated based on the area of roads in stratum i in year t ($A_{ROAD,i,t}$) and the carbon stock in all pools in the baseline case in stratum i ($C_{BSL,i}$), according to VMD0015 v2.2, equation 17.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions
Calculation method	Area of roads is taken from post-harvest assessment reports and post-harvest maps that are based on field measurements. Carbon stock in all pools in the baseline case are estimated as part of the baseline procedures. See VMD0015 v2.2, equation 17 at section 4.2.
Comments	-

Data / Parameter	$A_{ROAD,i,t}$
Data unit	ha
Description	Area of roads in stratum i in year t.
Source of data	Post exploration reports and associated GIS files.
Description of measurement methods and procedures applied	Measured in GIS.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	-
Comments	-

Data / Parameter	$\Delta C_{DECKS,i,t}$
Data unit	t CO ₂ -e
Description	Change in carbon stock resulting from logging deck creation in stratum i in year t.
Source of data	Calculated according to VMD0015 v2.2, equation 18.
Description of measurement methods and procedures applied	Calculated based on the area of logging decks in stratum i in year t ($A_{DECKS,i,t}$) and the carbon stock in all pools in the baseline case in stratum i ($C_{BSL,i}$) according to VMD0015 v2.2, equation 18.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	-
QA/QC procedures applied	-

Purpose of data	Calculation of project emissions
Calculation method	Area of logging decks is taken from post-harvest assessment reports and post-harvest maps that are based on field measurements. Carbon stock in all pools in the baseline case are estimated as part of the baseline procedures. See VMD0015 v2.2, equation 17 at section 4.2.
Comments	-

Data / Parameter	$A_{DECKS,i,t}$
Data unit	ha
Description	Area of logging decks in stratum i in year t.
Source of data	Post exploration reports and post-harvest maps.
Description of measurement methods and procedures applied	Area of logging decks is taken from post exploration reports and post-harvest maps that are based on field measurements.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	-
Comments	-

Data / Parameter	$A_{DistPA,q,i,t}$
Data unit	ha
Description	Area impacted by natural disturbance in the project stratum i converted to natural disturbance stratum q in year t; ha
Source of data	Remote Sensing imagery combined with ground verification

Description of measurement methods and procedures applied	Measured in a GIS environment through the DETER database, NBR analysis in Google Earth Engine and verified in the field using direct observation on site.														
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.														
Value applied:	Ex-ante: Table30 – Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE. Ex-post: Table 67 – Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE. <table border="1"> <thead> <tr> <th>Stratum</th><th>A_{DistPA,q,i,t}</th></tr> </thead> <tbody> <tr> <td>Aa</td><td>27.07</td></tr> <tr> <td>Ab</td><td>50.37</td></tr> <tr> <td>As</td><td>0</td></tr> <tr> <td>D</td><td>0</td></tr> <tr> <td>Db</td><td>0</td></tr> <tr> <td>Ds</td><td>0</td></tr> </tbody> </table>	Stratum	A _{DistPA,q,i,t}	Aa	27.07	Ab	50.37	As	0	D	0	Db	0	Ds	0
Stratum	A _{DistPA,q,i,t}														
Aa	27.07														
Ab	50.37														
As	0														
D	0														
Db	0														
Ds	0														
Monitoring equipment	Remote sensing data, DETER database, field collection and GIS software's														
QA/QC procedures applied	Orbital imaging steps will be supervised by a professional with more than ten years of experience remote sensing in tropical forests. In addition, field survey will be adopted to effect and guarantee quality imaging at extremely high spatial resolution. All Digital Image Processing (PDI) steps will be internally rechecked. The orbital imaging results will be compared with data collected in the field for validation, where such quality assurance and control procedures will be led by forest inventory specialists from the BRC team (see Appendix V - Monitoring_2_2022).														
Purpose of data	Calculation of project emissions.														
Calculation method	Spatially explicit information on forest degradation is downloaded from the DETER database and clipped with the spatial boundaries of the project area. A field incursion is carried out mapping the forest canopy and the forest floor surface. Forest gaps are identified based on mapping results and georeferenced. Investigation through direct observation of the mapped sites is carried out to conclude whether the area in question has been affected by any natural source of degradation.														
Comments	-														

Data / Parameter	DDRF (Degradation Disturbance Reduction Factor)
Data unit	Dimensionless
Description	Factor by which $A_{dist,q,i,t}$ is reduced to reflect the impact of the baseline degradation on available stocks for reduction due to disturbance
Source of data	Calculated according to VMD0015 v2.2, equation 19
Description of measurement methods and procedures applied	Calculated based on the average volume of fuelwood gathered in the project area in the baseline scenario in stratum i in year t ($FG_{BSL,i,t}$), the mean wood density of species harvested for fuelwood or charcoal production (D_{mn}), the carbon fraction of dry matter (CF), the area of stratum I (A_i) and the carbon stock in all pools in the baseline in stratum I ($C_{BSL,i}$), according to VMD0015 v2.2, equation 19.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions
Calculation method	The average volume of fuelwood gathered in the project area is estimated based on a Participatory Rural Appraisal (PRA). Basic wood density of all species is taken from the tropical wood density database (annex 12). Carbon fraction of biomass for dry matter is default according to IPCC (2006). Carbon stock in all pools in the baseline is calculated according to baseline procedures. The area impacted by natural disturbance is proportionally reduced to reflect previous firewood/charcoal extraction, according to VMD0015 v2.2, equation 19. See VMD0015 v2.2, equations 19 and 20 at section 4.2.
Comments	-

Data / Parameter	$A_{burn,i,t}$
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Data unit	ha														
Description	Area burnt for stratum i in year t.														
Source of data	Equal to AAplanned in the project case.														
Description of measurement methods and procedures applied	For the calculation of project emissions, the burned area is considered equivalent to burn scars monitored plus annual deforested area monitored, assuming that all deforestation is preceded by a fire to clear the land in the project case.														
Frequency of monitoring/recording	Annual.														
Value applied:	Ex-ante: Table33 – Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE. Ex-post: Table68_69_70 – Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE. <table border="1"> <thead> <tr> <th>Stratum</th><th>A_{burn,i,t}</th></tr> </thead> <tbody> <tr> <td>Aa</td><td>186.00</td></tr> <tr> <td>Ab</td><td>92.00</td></tr> <tr> <td>As</td><td>745.00</td></tr> <tr> <td>D</td><td>1,149.00</td></tr> <tr> <td>Db</td><td>2,677.44</td></tr> <tr> <td>Ds</td><td>369.30</td></tr> </tbody> </table>	Stratum	A _{burn,i,t}	Aa	186.00	Ab	92.00	As	745.00	D	1,149.00	Db	2,677.44	Ds	369.30
Stratum	A _{burn,i,t}														
Aa	186.00														
Ab	92.00														
As	745.00														
D	1,149.00														
Db	2,677.44														
Ds	369.30														
Monitoring equipment	NBR analysis in Google Earth Engine.														
QA/QC procedures applied	-														
Purpose of data	Calculation of project emissions														
Calculation method	-														
Comments	-														

Data / Parameter	$C_{P,Dist,q,i}$
Data unit	t CO ₂ -e ha ⁻¹
Description	Carbon stock in all pools in post-natural disturbance q in baseline stratum i.
Source of data	Calculated according to VMD0015 v2.2, equation 24.
Description of measurement methods and procedures applied	Calculated based on the carbon stock in aboveground tree biomass in stratum I ($C_{AB_tree,i}$), carbon stock in belowground tree biomass in stratum I ($C_{BB_tree,i}$), carbon stock in

	aboveground non-tree vegetation in stratum I ($C_{AB_non-tree,i}$), carbon stock in belowground non-tree vegetation in stratum I ($C_{BB_non-tree,i}$), carbon stock in dead wood in stratum I ($C_{DW,i}$), carbon stock in litter in stratum I ($C_{LI,i}$), mean stock in soil organic carbon in stratum I ($C_{SOC,i}$), according to VMD0015 v2.2, equation 24.														
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.														
Value applied:	Ex-ante: Coefficient of biomass loss of 0.3, according with Alencar et al. 2006 Ex-post: Coefficient of biomass loss 0.3, according with Alencar et al. 2006 Values obtained from Table31_32 – Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE. Ex-ante values are equal to ex-post. <table border="1"> <thead> <tr> <th>Stratum (i)</th><th>CP,Dist,q,i,t</th></tr> </thead> <tbody> <tr> <td>As</td><td>206.86</td></tr> <tr> <td>Ds</td><td>221.47</td></tr> <tr> <td>Aa</td><td>179.51</td></tr> <tr> <td>Ab</td><td>189.66</td></tr> <tr> <td>Db</td><td>233.27</td></tr> <tr> <td>D</td><td>284.06</td></tr> </tbody> </table>	Stratum (i)	CP,Dist,q,i,t	As	206.86	Ds	221.47	Aa	179.51	Ab	189.66	Db	233.27	D	284.06
Stratum (i)	CP,Dist,q,i,t														
As	206.86														
Ds	221.47														
Aa	179.51														
Ab	189.66														
Db	233.27														
D	284.06														
Monitoring equipment	-														
QA/QC procedures applied	-														
Purpose of data	Calculation of project emissions														
Calculation method	Carbon stock in pools in post-natural disturbance strata is measured following a standard operational procedure for biomass inventory (Appendix IV – Carbon Pools), which is based on VMD0001 v1.1, VMD0002 v1.0, VMD0003 v1.0 and VMD0004 v1.0 criteria. Carbon stock sequestered in wood products from harvests following natural disturbance in post-natural disturbance stratum is calculated according to VMD0005 v1.1 in the case of use of wood from the stratum where the disturbances of natural cause occurred. See VMD0015 v2.2, equation 24 at section 4.2.														
Comments															

Data / Parameter	$\Delta C_{P,Dist,q,i,t}$														
Data unit	t CO ₂ -e ha ⁻¹														
Description	Net carbon stock changes in pools as a result of natural disturbance in the project case in post-natural disturbance stratum q in stratum i in year t.														
Source of data	Calculated according to VMD0015 v2.2, equation 23.														
Description of measurement methods and procedures applied	Calculated based on the carbon stock in all pools in the baseline case in stratum I (CBSL,i), carbon stock in pools in post-natural disturbance strata q in stratum I (CP,Dist,q,i) and carbon stock sequestered in wood products from harvests following natural disturbance in post-natural disturbance stratum q, in stratum I (CDist, WP,q,i), according to VMD0015 v2.2, equation 23.														
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.														
Value applied:	Values obtained from Table31_32 – Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE. Ex-ante values are equal to ex-post. <table> <tr> <th>Stratum (i)</th><th>$\Delta C_{p,dist,q,i,t}$</th></tr> <tr> <td>As</td><td>482.67</td></tr> <tr> <td>Ds</td><td>516.76</td></tr> <tr> <td>Aa</td><td>418.86</td></tr> <tr> <td>Ab</td><td>442.53</td></tr> <tr> <td>Db</td><td>544.30</td></tr> <tr> <td>D</td><td>662.82</td></tr> </table>	Stratum (i)	$\Delta C_{p,dist,q,i,t}$	As	482.67	Ds	516.76	Aa	418.86	Ab	442.53	Db	544.30	D	662.82
Stratum (i)	$\Delta C_{p,dist,q,i,t}$														
As	482.67														
Ds	516.76														
Aa	418.86														
Ab	442.53														
Db	544.30														
D	662.82														
Monitoring equipment	-														
QA/QC procedures applied	-														
Purpose of data	Calculation of project emissions														
Calculation method	Carbon stock in all pools in the baseline case is calculated as part of the procedures to estimate baseline GHG emissions. Carbon stock in pools in post-natural disturbance strata is measured following a standard operational procedure for biomass inventory (Appendix IV – Carbon Pools Measures), which is based on VMD0001 v1.1, VMD0002 v1.0, VMD0003 v1.0 and VMD0004 v1.0 criteria. Carbon stock sequestered in wood products from harvests following natural disturbance in post-natural disturbance stratum is calculated according to VMD0005 v1.1 in the case of use of wood from the stratum														

	where the disturbances of natural cause occurred. See VMD0015 v2.2, equation 23 at section 4.2.
Comments	-

Data / Parameter	$\Delta C_{P,DistPA,i,t}$																						
Data unit	t CO ₂ -e																						
Description	Net carbon stock changes as a result of natural disturbance in the project case in the project area in stratum i in year t.																						
Source of data	Calculated according to VMD0015 v2.2, equation 20.																						
Description of measurement methods and procedures applied	Estimated based on the Area impacted by natural disturbance in post-natural disturbance stratum q in stratum i, in year t ($A_{DistPA,q,i,t}$), and the net carbon stock changes in pools as a result of natural disturbance in post-natural disturbance stratum q in stratum i in year t ($\Delta C_{P,Dist,q,i,t}$), according to VMD0015 v2.2, equation 20.																						
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.																						
Value applied:	Ex-ante: Table 31_32 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE. Ex-post: Table 48 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE. <table border="1"> <thead> <tr> <th>Instance</th><th>$\Delta C_{P,DistPA,i,t}$ (t CO₂e)</th></tr> </thead> <tbody> <tr><td>PAI #1</td><td>0</td></tr> <tr><td>PAI #2</td><td>0</td></tr> <tr><td>PAI #3</td><td>6,214.72</td></tr> <tr><td>PAI #4</td><td>24,758.61</td></tr> <tr><td>PAI #5</td><td>2,655.57</td></tr> <tr><td>PAI #6</td><td>0</td></tr> <tr><td>PAI #7</td><td>0</td></tr> <tr><td>PAI #8</td><td>0</td></tr> <tr><td>PAI #9</td><td>0</td></tr> <tr><td>Total</td><td>33,628.91</td></tr> </tbody> </table>	Instance	$\Delta C_{P,DistPA,i,t}$ (t CO ₂ e)	PAI #1	0	PAI #2	0	PAI #3	6,214.72	PAI #4	24,758.61	PAI #5	2,655.57	PAI #6	0	PAI #7	0	PAI #8	0	PAI #9	0	Total	33,628.91
Instance	$\Delta C_{P,DistPA,i,t}$ (t CO ₂ e)																						
PAI #1	0																						
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PAI #4	24,758.61																						
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PAI #6	0																						
PAI #7	0																						
PAI #8	0																						
PAI #9	0																						
Total	33,628.91																						
Monitoring equipment	-																						
QA/QC procedures applied	-																						
Purpose of data	Calculation of project emissions																						
Calculation method	Calculated according to VMD0015 v2.2, equation 20.																						

Comments	-
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Data / Parameter	GHG _{P,E,i,t}
Data unit	t CO ₂ e.yr ⁻¹
Description	Greenhouse gas emissions as a result of deforestation activities within the within the project area in the project case stratum i in year t.
Source of data	Calculated based on VMD0006 v1.3 equation 15.
Description of measurement methods and procedures applied	Calculated based on the non-CO ₂ emissions due to biomass burning in stratum i in year t ($E_{\text{BiomassBurn},i,t}$), according to VMD0006 v1.3 equation 15.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: This table has been omitted due to its size. Please see the values applied in the "20. Baseline - Final data" spreadsheets (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: This table has been omitted due to its size. Please see the values applied "26. MR2 - GHG Non CO2" spreadsheets (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	Calculated based on VMD0006 v1.3 equation 30.
Comments	Net CO ₂ e emission from fossil fuel combustion in stratum i in year t ($E_{\text{FC},i,t}$) and direct N ₂ O emission as a result of nitrogen application on the alternative land use within the project boundary in stratum i in year t ($N_{2\text{Odirect-N},i,t}$) are conservatively excluded from the project scope and the calculation of the baseline estimates following VM0007 v1.6 section 5.4 criteria.

Data / Parameter	$E_{\text{BiomassBurn},i,t}$
Data unit	t CO ₂ e

Description	Greenhouse gas emissions due to biomass burning in stratum i in year t of each GHG (CO ₂ , CH ₄ , N ₂ O)
Source of data	Calculated based on VMD0013 v1.3 equation 1.
Description of measurement methods and procedures applied	Calculated based on area burnt for stratum i in year t ($A_{burn,i,t}$), average aboveground biomass stock before burning stratum i, in year t ($B_{i,t}$), combustion factor for stratum i (unitless) ($COMF_i$), emission factor for stratum i for gas g (Gg_i) and the Global warming potential for gas g (GWP_g), according to VMD0013 v1.3 equation 1.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 2,374.88 t CO ₂ e (Table 33 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: 2,160.05 t CO ₂ e (Table 68 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of project emissions.
Calculation method	Calculated based on VMD0013 v1.3 equation 1.
Comments	-

Data / Parameter	$\Delta C_{WPS-REDD}$
Data unit	t CO ₂ -e
Description	Net GHG emissions in the REDD project scenario up to year t.
Source of data	Calculated according to VMD0015 v2.2, equation 01.
Description of measurement methods and procedures applied	Calculated based on net carbon stock change as a result of deforestation in the project area in the project case in stratum i in year t ($\Delta C_{P,DefPA,i,t}$), Net carbon stock change as a result of degradation in the project area in the project case in stratum i in year t ($\Delta C_{P,Deg,i,t}$), Net carbon stock change as a result of natural disturbance in the project area in the project case in stratum i in year t ($\Delta C_{P,DistPA,i,t}$) and Greenhouse gas emissions as a result of deforestation and degradation activities within the project area in the project case in stratum i in year t ($GHG_{P-E,i,t}$), according to VMD0015 v2.2, equation 01.

Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 33,217 t CO ₂ e (Table 34 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: 139,621 t CO ₂ e (Table 75 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	N/A
QA/QC procedures applied	BRC GHG information system and controls associated with the project and its monitoring. This information system rules the process for obtaining, recording, compiling and analyzing data and information important for quantifying and reporting GHG emissions and removals relevant for the project (including leakage) and baseline scenario (see Appendix II – Calculus Tables).
Purpose of data	Calculation of project emissions
Calculation method	See VMD0015 v2.2, equation 01.
Comments	-

Data / Parameter	$\Delta C_{LK-REDD}$
Data unit	t CO ₂ e
Description	Net GHG emissions due to leakage from the REDD project activity up to year t*
Source of data	Calculated according to VM0007 v1.6 equation 4.
Description of measurement methods and procedures applied	Calculated based on net GHG emissions due to activity shifting leakage for projects preventing planned deforestation up to year t ($\Delta C_{LK-AS,planned}$), and the Net GHG emissions due to market-effects leakage up to year t* (ΔC_{LK-ME}), according to VM0007 v1.6 equation 4.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 99,415 tCO ₂ e (Table 35 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: 135,604 tCO ₂ e (Table 71 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-

QA/QC procedures applied	-
Purpose of data	Calculation of leakage.
Calculation method	Calculated according to VM0007 v1.6 equation 4.
Comments	-

Data / Parameter	$\Delta C_{LK-AS,planned}$										
Data unit	t CO ₂ e										
Description	Net GHG emissions due to activity shifting leakage for projects preventing planned deforestation up to year t*										
Source of data	Calculated according to VMD0009 v1.3, equation 01.										
Description of measurement methods and procedures applied	Calculated based on the area of activity shifting leakage in stratum I in year t ($LK_{Aplanned,i,t}$), the net carbon stock changes in all pre-deforestation pools in baseline stratum I, ($\Delta C_{BSL,i}$) and the Greenhouse gas emissions as a result of leakage of avoiding deforestation activities in stratum i in year t ($GHG_{LK,E,i,t}$), according to VMD0009 v1.3, equation 01.										
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.										
Value applied:	Ex-ante: 0 (Table 35 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: Values extracted from Table71_LK_ASP_Total – (Appendix II - Calculus tables - 01_INTEGRATED_CALCULUS_TABLE). <table border="1"> <thead> <tr> <th>Stratum</th><th>$\Delta CLK-AS,planned$</th></tr> </thead> <tbody> <tr> <td>SN</td><td>15,743</td></tr> <tr> <td>Da</td><td>3,423</td></tr> <tr> <td>Ds</td><td>17,024</td></tr> <tr> <td>Total</td><td>36,190</td></tr> </tbody> </table>	Stratum	$\Delta CLK-AS,planned$	SN	15,743	Da	3,423	Ds	17,024	Total	36,190
Stratum	$\Delta CLK-AS,planned$										
SN	15,743										
Da	3,423										
Ds	17,024										
Total	36,190										
Monitoring equipment	-										
QA/QC procedures applied	-										
Purpose of data	Calculation of leakage.										
Calculation method	Calculated according to VMD0009 v1.3, equation 01.										

Comments	-
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Data / Parameter	$LK_{Aplanned,i,t}$								
Data unit	ha								
Description	The area of activity shifting leakage in stratum i in year t.								
Source of data	Calculated according to VMD0009 v1.3, equation 06.								
Description of measurement methods and procedures applied	Calculated according to the total area of monitored deforestation by the baseline agent of the planned deforestation in stratum i in year t ($A_{defLK,i,t}$), and the New calculated forest clearance by the baseline agent of the planned deforestation in stratum i in year t where no leakage is occurring ($NewR_{i,t}$).								
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.								
Value applied:	Ex-ante: This table was omitted due its size, please see the values applied in the table 35_LK-ASP of PAIs individual spreadsheets (see Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: Values extracted from Table71_LK_ASP_Total – (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). <table border="1"> <thead> <tr> <th>Stratum</th><th>$LK_{Aplanned,i,t}$ (ha)</th></tr> </thead> <tbody> <tr> <td>SN</td><td>62.7</td></tr> <tr> <td>Da</td><td>2.5</td></tr> <tr> <td>Ds</td><td>28.2</td></tr> </tbody> </table>	Stratum	$LK_{Aplanned,i,t}$ (ha)	SN	62.7	Da	2.5	Ds	28.2
Stratum	$LK_{Aplanned,i,t}$ (ha)								
SN	62.7								
Da	2.5								
Ds	28.2								
Monitoring equipment	-								
QA/QC procedures applied	-								
Purpose of data	Calculation of leakage.								
Calculation method	Calculated according to VMD0009 v1.3, equation 06.								
Comments	-								

Data / Parameter	$A_{defLK,i,t}$
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Data unit	ha
Description	The total area of monitored deforestation by the baseline agent of the planned deforestation in stratum i in year t.
Source of data	Remote sensing imagery (Sentinel 2, Landsat 8), PRODES database.
Description of measurement methods and procedures applied	Annual deforestation is measured in GIS using remote sensing techniques and reported with spatial explicit data by raster and shapefile. evidence.
Frequency of monitoring/recording	Annual
Value applied:	Ex-ante: 0 - table 35_LK-ASP of PAIs individual spreadsheets (see Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: 94 (Table71_LK_ASP_Total - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	Landsat 8 OLI, Sentinel MSI.
QA/QC procedures applied	Accuracy assessment of PRODES classification was performed by comparing each class of the land cover map from the reference period (2011 to 2021 - Acre and 2012 to 2022 - Para) with a set of 200 points randomly distributed over the reference region for each year. The reference data used for this step comes from the visual interpretation of high spatial resolution images available in Google Earth. The global accuracy of the mapping for the different classes of land cover presented values above 95% for all three classes in each year analyzed. The overall accuracy of the forest cover reference map (2020) was 95.5%. In 2022, satellite images were used to validate the APD areas. Landsat 8 was used for 10 years before the start of the project and Sentinel 2 for the start date. An algorithm based on machine learning (Random Forest) was used for the classification of the images, the methodological details and accuracy of which are presented by PAI in Forest_Class_Validation_2022 of Appendix X - GIS data.
Purpose of data	Calculation of leakage.
Calculation method	Classified images with information about the area of annual deforestation in Brazil are downloaded from PRODES websites and clipped with the project area spatial limits. Images from Sentinel are downloaded from ESA.
Comments	-

Data / Parameter	$NewR_{i,t}$
Data unit	ha
Description	New calculated forest clearance by the baseline agent of the planned deforestation in stratum i in year t where no leakage is occurring.
Source of data	Calculated according to VMD0009 v1.3, equation 04 or 05.
Description of measurement methods and procedures applied	Calculated based on projected annual proportion of land that will be deforested outside the project boundary in stratum i in year t ($D\%_{planned,i,t,OP}$), and Total area of planned deforestation outside the project boundary over the baseline period for stratum I ($A_{planned,i,OP}$), according to equation 04 or based on Deforestation by the baseline agent of the planned deforestation in stratum i in year t in the absence of the project ($WoPR_{i,t}$), projected annual proportion of land that will be deforested in project stratum i in year t ($D\%_{planned,i,t}$), and Total area of planned deforestation over the baseline period for project stratum I ($A_{planned,i}$).
Frequency of monitoring/recording	Annual
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of leakage.
Calculation method	Calculated according to VMD0009 v1.3, equation 04 or 05.
Comments	Equation 04 is used when an identified deforestation agent has made public a business plan or similar documentation containing data suited for estimating a conversion rate over the baseline period. Equation 05 is used when the conversion rate must be estimated. In the case of equation 05 is used, the projected annual proportion of land that will be deforested is the same used to set the baseline, while the deforestation provoked by the identified deforestation agent is calculated by VMD0009 v1.3, equation 01 or 02.

Data / Parameter	$D\%_{planned,i,t,OP}$
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Data unit	%
Description	Projected annual proportion of land that will be deforested outside the project boundary in stratum i in year t.
Source of data	Deforestation permits for areas outside the project boundary.
Description of measurement methods and procedures applied	Defined in deforestation permits.
Frequency of monitoring/recording	N/A
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	N/A
QA/QC procedures applied	N/A
Purpose of data	Calculation of leakage.
Calculation method	N/A
Comments	This parameter is used when an identified deforestation agent has made public a business plan or similar documentation containing data suited for estimating a conversion rate over the baseline period in areas outside the project boundary.

Data / Parameter	$A_{planned,i,OP}$
Data unit	ha
Description	Total area of planned deforestation outside the project boundary over the baseline period for stratum i
Source of data	Deforestation permits for areas outside the project boundary.
Description of measurement methods and procedures applied	Defined in deforestation permits.
Frequency of monitoring/recording	N/A
Value applied:	Ex-ante: 0 Ex-post: 0
Monitoring equipment	N/A

QA/QC procedures applied	N/A
Purpose of data	Calculation of leakage.
Calculation method	N/A
Comments	This parameter is used when an identified deforestation agent has made public a business plan or similar documentation containing data suited for estimating a conversion rate over the baseline period in areas outside the project boundary.

Data / Parameter	$WoPR_{i,t}$
Data unit	ha
Description	Deforestation by the baseline agent of the planned deforestation in the absence of the project in stratum i in year t.
Source of data	Calculated according to VMD0009 v1.3, equation 01 or 02.
Description of measurement methods and procedures applied	Projected based on linear regression according to VMD0009 v1.3 equation 01 or based on number of hectares of forest cleared by the baseline agent of the planned deforestation in the five years prior to project implementation in stratum i by agent ag within the country ($HistHa_{i,ag}$), according to VMD0009 v1.3 equation 02.
Frequency of monitoring/recording	Annual
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures applied	N/A
Purpose of data	Calculation of leakage.
Calculation method	Equation 01 is used when the results of the analysis must produce a statistically significant regression with a $p \leq 0.05$ and an adjusted r^2 of ≥ 0.75 . The regression is calculated based on the deforestation made by the deforestation agent each year over the previous five years within the country. Where no statistically significant regression can be found, equation 02 is used.
Comments	-

Data / Parameter	HistHai,ag
Data unit	ha
Description	Number of hectares of forest cleared by the baseline agent of the planned deforestation in the five years prior to project implementation in stratum i by agent ag within the country
Source of data	Remote sensing imagery (Sentinel 2, Landsat 8), PRODES database.
Description of measurement methods and procedures applied	Annual deforestation is measured in GIS using remote sensing techniques and reported with spatial explicit data by raster and shapefile. evidence.
Frequency of monitoring/recording	Annual
Value applied:	Ex-ante: 0 Ex-post: This table was omitted due to its size, please see the values applied in table26_32 of PAIs individual spreadsheets. (Appendix II – Calculus Table)
Monitoring equipment	Landsat 8 OLI, Sentinel MSI.
QA/QC procedures applied	Accuracy assessment of PRODES classification was performed by comparing each class of the land cover map from the reference period (2011 to 2021 - Acre and 2012 to 2022 - Para) with a set of 200 points randomly distributed over the reference region for each year. The reference data used for this step comes from the visual interpretation of high spatial resolution images available in Google Earth. The global accuracy of the mapping for the different classes of land cover presented values above 95% for all three classes in each year analyzed. The overall accuracy of the forest cover reference map (2020) was 95.5%. In 2022, satellite images were used to validate the APD areas. Landsat 8 was used for 10 years before the start of the project and Sentinel 2 for the start date. An algorithm based on machine learning (Random Forest) was used for the classification of the images, the methodological details and accuracy of which are presented by PAI in Forest_Class_Validation_2022 of Appendix X - GIS data.
Purpose of data	Calculation of leakage.
Calculation method	Classified images with information about the area of annual deforestation in Brazil are downloaded from PRODES websites and clipped with the project area spatial limits. Images from Sentinel are downloaded from ESA.

Comments	-
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Data / Parameter	$GHG_{LK,E,i,t}$								
Data unit	t CO ₂ e								
Description	Greenhouse gas emissions as a result of leakage of avoiding deforestation activities in stratum i in year t.								
Source of data	Calculated according to VMD0009 v1.3, equation 07.								
Description of measurement methods and procedures applied	Calculated based on Non-CO ₂ " emissions due to biomass burning in stratum i in year t ($E_{biomassburn,i,t}$), according to VMD0009 v1.3, equation 07.								
Frequency of monitoring/recording	Annual								
Value applied:	Ex-ante: 0 Ex-post: <table border="1"> <thead> <tr> <th>Stratum</th><th>$GHG_{LK,E,i}$</th></tr> </thead> <tbody> <tr> <td>SN</td><td>1.205</td></tr> <tr> <td>Da</td><td>1.626</td></tr> <tr> <td>Ds</td><td>255</td></tr> </tbody> </table>	Stratum	$GHG_{LK,E,i}$	SN	1.205	Da	1.626	Ds	255
Stratum	$GHG_{LK,E,i}$								
SN	1.205								
Da	1.626								
Ds	255								
Monitoring equipment	-								
QA/QC procedures applied	-								
Purpose of data	Calculation of leakage								
Calculation method	Calculated according to VMD0009 v1.3, equation 07								
Comments	-								

Data / Parameter	ΔC_{LK-ME}
Data unit	t CO ₂ -e
Description	Net greenhouse gas emissions due to market- effects leakage
Source of data	Calculated according to VMD0011 v1.0 equation 1.

Description of measurement methods and procedures applied	Calculated based on Total GHG emissions due to market-effects leakage through decreased timber harvest ($LK_{MarketEffects,timber}$), and Total GHG emissions due to market leakage through decreased harvest of fuelwood and charcoal sold into regional and/or national markets ($LK_{MarketEffects,FW/C}$), according to VMD0011 v1.0 equation 1.
Frequency of monitoring/recording	Annual
Value applied:	Ex-ante: 99,415 t CO ₂ e (Table 37 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: 99,415 t CO ₂ e (Table 71 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of leakage
Calculation method	Calculated according to VMD0011 v1.0 equation 1.
Comments	-

Data / Parameter	$LK_{MarketEffects,timber}$
Data unit	t CO ₂ -e
Description	Total GHG emissions due to market- effects leakage through decreased timber harvest
Source of data	Calculated according to VMD0011 v1.0 equation 2
Description of measurement methods and procedures applied	Calculated according to leakage factor for market-effects calculations (LF_{ME}) and summed emissions from timber harvest in stratum i in the baseline case potentially displaced through implementation of carbon project (ALT_i), according to VMD0011 v1.0 equation 2.
Frequency of monitoring/recording	Annual
Value applied:	Ex-ante: 97,443 t CO ₂ e (Table 37 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: : 97,443 t CO ₂ e (Table 37 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-
QA/QC procedures applied	-

Purpose of data	Calculation of leakage
Calculation method	Calculated according to VMD0011 v1.0 equation 2
Comments	-

Data / Parameter	LF_{ME}
Data unit	Dimensionless
Description	Leakage factor for market-effects calculations.
Source of data	Default data from VMD0011 v1.0
Description of measurement methods and procedures applied	A comparison between the proportion of total biomass in commercial species that is merchantable (PMP_i) and the mean proportion of total biomass that is merchantable for each forest type (PML_{FT}) was performed based on the wood volume to be extracted in PAIs #1 and #2 and the wood volume found by the RADAMBRASIL project for all types of forest existing in the project area in all states of Amazonia Legal.
Frequency of monitoring/recording	Annual
Value applied:	0.2
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of leakage
Calculation method	See Appendix V of the 1 st Monitoring Report.
Comments	-

Data / Parameter	PMP_i
Data unit	$m^3 \cdot ha^{-1}$
Description	Total volume in commercial species that is merchantable.
Source of data	Pre-exploratory inventories/Forest Exploration Plans.
Description of measurement methods and procedures applied	Commercial species volume was evaluated in both PAIs for all trees with DBH above 30cm.
Frequency of monitoring/recording	-

Value applied:	Values obtained from "17. LK-ME – Parameters" spreadsheet. <table border="1"> <thead> <tr> <th>Instance</th><th>PMPi (m³)</th></tr> </thead> <tbody> <tr><td>PAI#1</td><td>17</td></tr> <tr><td>PAI#2</td><td>27.6</td></tr> <tr><td>PAI#3</td><td>22.3</td></tr> <tr><td>PAI#4</td><td>22.3</td></tr> <tr><td>PAI#5</td><td>22.3</td></tr> <tr><td>PAI#6</td><td>22.3</td></tr> <tr><td>PAI#7</td><td>22.3</td></tr> <tr><td>PAI#8</td><td>22.3</td></tr> <tr><td>PAI#9</td><td>22.3</td></tr> </tbody> </table>	Instance	PMPi (m ³)	PAI#1	17	PAI#2	27.6	PAI#3	22.3	PAI#4	22.3	PAI#5	22.3	PAI#6	22.3	PAI#7	22.3	PAI#8	22.3	PAI#9	22.3
Instance	PMPi (m ³)																				
PAI#1	17																				
PAI#2	27.6																				
PAI#3	22.3																				
PAI#4	22.3																				
PAI#5	22.3																				
PAI#6	22.3																				
PAI#7	22.3																				
PAI#8	22.3																				
PAI#9	22.3																				
Monitoring equipment	-																				
QA/QC procedures applied	-																				
Purpose of data	-																				
Calculation method	-																				
Comments	-																				

Data / Parameter	LDF
Data unit	t C m-3
Description	Logging damage factor.
Source of data	Default value provided by VMD0011 v1.0.
Description of measurement methods and procedures applied	-
Frequency of monitoring/recording	-
Value applied:	0.53
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of leakage.
Calculation method	-
Comments	See VMD0011 v1.0 equation 4.

Data / Parameter	LIF
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Data unit	t C m-3
Description	Logging infrastructure factor.
Source of data	Default value provided by VMD0011 v1.0.
Description of measurement methods and procedures applied	-
Frequency of monitoring/recording	-
Value applied:	0.29
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of leakage.
Calculation method	-
Comments	See VMD0011 v1.0 equation 4.

Data / Parameter	$AL_{FW/C,i}$
Data unit	t CO ₂ -e
Description	Summed emissions from fuelwood/charcoal harvests in stratum i in the baseline case potentially displaced through implementation of carbon; t CO ₂ -e
Source of data	Calculated according to VMD0011 v1.0 equation 6.
Description of measurement methods and procedures applied	Calculated based on the sum of the values of Carbon emission due to displaced fuelwood/charcoal harvests in stratum i in the baseline scenario at time t ($C_{BSL,XBFWC,t}$), according to VMD0011 v1.0 equation 6.
Frequency of monitoring/recording	-
Value applied:	This table has been omitted due to its size. Please see values applied for each stratum I in "18. LK-ME - CLK-ME" spreadsheet (Appendix II).
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of leakage
Calculation method	Calculated according to VMD0011 v1.0 equation 6.

Comments	-
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Data / Parameter	$AL_{T,i}$
Data unit	t CO ₂ -e
Description	Summed emissions from timber harvest in stratum i in the baseline case potentially displaced through implementation of carbon project; t CO ₂ -e
Source of data	Calculated according to VMD0011 v1.0 equation 3.
Description of measurement methods and procedures applied	Calculated based on the total volume that would have been logged in the baseline in the project area across strata and time periods, according to VMD0011 v1.0 equation 3.
Frequency of monitoring/recording	-
Value applied:	This table has been omitted due to its size. Please see values applied for each stratum I in "18. LK-ME - CLK-ME" spreadsheet (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of leakage
Calculation method	Calculated according to VMD0011 v1.0 equation 3.
Comments	-

Data / Parameter	$C_{BSL,XBT,t}$
Data unit	t CO ₂ -e
Description	based on the total volume that would have been logged in the baseline in the project area across strata and time periods
Source of data	Calculated according to VMD0011 v1.0 equation 4.
Description of measurement methods and procedures applied	Calculated from the biomass carbon of the extracted timber and the biomass carbon in the forest damaged in the process of timber extraction, according to VMD0011 v1.0 equation 4.
Frequency of monitoring/recording	-
Value applied:	This table has been omitted due to its size. Please see values applied for each stratum I in "18. LK-ME - CLK-ME"

	spreadsheet (Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of leakage
Calculation method	Calculated according to VMD0011 v1.0 equation 4.
Comments	-

Data / Parameter	$LK_{MarketEffects,FW/C}$
Data unit	t CO ₂ -e
Description	Total GHG emissions due to market leakage through decreased harvest of fuelwood and charcoal sold into regional and/or national markets
Source of data	Calculated according to VMD0011 v1.0 equation 5.
Description of measurement methods and procedures applied	Calculated based on Leakage factor for market effects calculations (LF_{ME}), and the summed emissions from fuelwood/charcoal harvests in stratum i in the baseline case potentially displaced through implementation of carbon ($AL_{FW/C,i}$), according to VMD0011 v1.0 equation 5.
Frequency of monitoring/recording	Annual
Value applied:	Ex-ante: 1,972 t CO ₂ e (Table 37 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: : 1,972 t CO ₂ e (Table 37 - Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of leakage
Calculation method	Calculated according to VMD0011 v1.0 equation 5.
Comments	-

Data / Parameter	NER_{REDD}
Data unit	t CO ₂ e

Description	Total net GHG emission reductions of the REDD project activity up to year t (t CO ₂ e).
Source of data	Calculated according to VM0007 v1.6 equation 2.
Description of measurement methods and procedures applied	Calculated based on the net GHG emissions in the REDD baseline scenario up to year t ($\Delta C_{BSL-REDD}$), the net GHG emissions in the REDD project scenario up to year t ($\Delta C_{WPS-REDD}$) and the net GHG emissions due to leakage from the REDD project activity up to year t ($\Delta C_{LK-REDD}$), according to VM0007 v1.6 equation 2.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex- ante: 2,600,888 t CO ₂ e (Table 40 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: 2,458,294 t CO ₂ e (Table 77 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of VCUs
Calculation method	According to VM0007 v1.6 equation 2.
Comments	-

Data / Parameter	Buffer _{Planned}
Data unit	t CO ₂ e
Description	Buffer withholding for avoiding planned deforestation project activities
Source of data	Calculated according to VM0007 v1.6 equation 14.
Description of measurement methods and procedures applied	Calculated based on the net greenhouse gas emissions in the baseline from planned deforestation up to year t ($\Delta C_{BSL,planned}$) and the buffer withholding percentage (Buffer%), according to VM0007 v1.6 equation 8.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex- ante: 270,030 t CO ₂ e (Table41 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

	Ex-post: 259,390 t CO ₂ e (Table 78 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of VCUs
Calculation method	Calculated according to VM0007 v1.6 equation 14.
Comments	See details in Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE.

Data / Parameter	Uncertainty_{REDD-BSL,SS}
Data unit	%
Description	Total uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline scenario
Source of data	Calculated according to VMD0017 v2.2 equation 5.
Description of measurement methods and procedures applied	Calculated based on the percentage uncertainty in the combined carbon stocks and greenhouse gas sources in stratum i in the REDD baseline scenario ($U_{REDD-BSL,SS,i}$), and the sum of combined carbon stocks and GHG sources in the REDD baseline scenario ($E_{REDD-BSL,SS,t,i}$), according to VMD0017 v2.2 equation 5.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	0.7 % ("Table_Uncertainty" of the Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of VCUs
Calculation method	Calculated according to VMD0017 v2.2 equation 5.
Comments	Uncertainty in baseline rate of deforestation is set as zero ($Uncertainty_{REDD-BSL,RATE} = 0$), as the deforestation rates are based on actual deforestation plans, following VMD0017 v2.2, section 5.1.1 criteria. In this sense $Uncertainty_{REDD-BSL,SS}$ equals to cumulative uncertainty in REDD baseline scenario up to year t ($Uncertainty_{REDD-BSL,t}$).

Data / Parameter	Uncertainty_{REDD-WPS}
Data unit	%
Description	Total uncertainty in the REDD project scenario
Source of data	Calculated according to VMD0017 v2.2 equation 13.
Description of measurement methods and procedures applied	Calculated according to the percentage uncertainty in the combined carbon stocks and greenhouse gas sources in stratum i in the REDD project scenario ($U_{REDD-WPS,SS,i}$) and the sum of combined carbon stocks and GHG sources multiplied by the area of stratum i (A_i) in the REDD project scenario ($E_{REDD-WPS,SS,t,i}$), according to VMD0017 v2.2 equation 13.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	0
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of VCUs.
Calculation method	Calculated according to VMD0017 v2.2 equation 13.
Comments	Where no ex post (re-)measurements of carbon pools or GHG sources have been made, ie, uncertainty from these sources is already included in Uncertainty _{REDD-BSL,t*} , Uncertainty _{REDD-WPS} is set equal to zero.

Data / Parameter	NER_{REDD+_ERROR}
Data unit	%
Description	Cumulative uncertainty for the REDD+ project activities up to year t
Source of data	Calculated according to VMD0017 v2.2 equation 21
Description of measurement methods and procedures applied	Calculated based on Cumulative uncertainty in REDD baseline scenario up to year t (Uncertainty _{REDD_BSL,t}), the total uncertainty in the REDD project scenario (Uncertainty _{REDD_WPS}), the Net GHG emissions in the REDD baseline scenario up to year t ($\Delta C_{BSL-REDD,t}$), and the Net GHG emissions in the REDD project scenario up to year t ($\Delta C_{WPS-REDD,t}$), according to VMD0017 v2.2 equation 21

Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 179,220 tCO ₂ e (Table 40 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: 171,112 tCO ₂ e (Table 77 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of VCUs
Calculation method	Calculated according to VMD0017 v2.2 equation 21
Comments	-

Data / Parameter	Adjusted_NER _{REDD+}
Data unit	%
Description	Total net GHG emission reductions of the REDD+ project activities up to year t* adjusted to account for uncertainty
Source of data	Calculated according to VMD0017 v2.2 equation 2
Description of measurement methods and procedures applied	Calculated based on the total net GHG emission reductions of the REDD project activity up to year t (NER _{REDD}), and the cumulative uncertainty for the REDD+ project activities up to year t (NER _{REDD+_ERROR}).
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex- ante: 2,600,888 t CO ₂ e (Table 40 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: 2,458,294 t CO ₂ e (Table 77 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of VCUs.
Calculation method	Calculated according to VMD0017 v2.2 equation 2.
Comments	-

Data / Parameter	VCUt
Data unit	VCU
Description	Number of Verified Carbon Units at year t* or t2 - t1
Source of data	Calculated according to VM0007 v1.6 equation 19.
Description of measurement methods and procedures applied	Calculated based on the total net GHG emission reductions of the REDD+ project activity up adjusted to account for uncertainty (Adjusted_NER _{REDD+}), and the total permanence risk buffer withholding (Buffer _{Planned}), according to VMD0017 v2.2 equation 19.
Frequency of monitoring/recording	Before every verification event with a minimum frequency of 05 years.
Value applied:	Ex-ante: 2,330,858 VCU (Table 41 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE). Ex-post: 2,198,904 VCU (Table 78 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).
Monitoring equipment	-
QA/QC procedures applied	-
Purpose of data	Calculation of VCUs
Calculation method	Calculated according to VM0007 v1.6 equation 19.
Comments	-

3.1.3 Monitoring Plan

For all project activity instances, already verified or under verification, project implementation will be monitored considering the project activities as defined in section 1.11. The GPD presents a range of potential project activities. The project activities may vary among PAIs. Below we present relevant information, following VM0007 v1.6 section 9.3.1 and VMD0015 v2.2 criteria. For this monitoring report the VM0007 v1.6 section 9.3.1 address the task that must be included in monitoring plan:

- Monitoring actual carbon stock changes and greenhouse gas emissions.

This section also includes the following information:

- Technical description of the monitoring task
- Data collected

- c) Overview of data collection procedures
- d) Quality control and quality assurance procedure
- e) Data archiving
- f) Organization and responsibilities of the parties involved in all of the above

For all project activity instances, already verified or under verification, BRC will be responsible for the project activity implementation and its monitoring. Implementation of specific project activities can be carried out by external consultants operating under supervision of BRC. Digital files are always stored in BRC database⁴. Hard copies are archived at BRC headquarters⁵. The following table specifies and summarizes the process during the monitoring period.

Table 15. Project monitored activities.

Standardized Benefits Category	Project activity	Technical description of the monitoring task	Evidence and arguments
Forest Cover/GHG emission reduction	Legal Protection	Legal protection for the forests was granted through signature of long-term conservation agreements with landowners of each PAI. This activity will be monitored 'through verifications on the ongoing administrative processes to close new deals with landowners in each quarter.	The agreements are made for 30 years and imply landowners' commitment to the conservation of specific forest areas on their properties. In other words, by signing the agreement, landowners undertake not to carry out activities that involve the forest conversion to other land uses, such as livestock or agriculture, for the project lifetime. Agreements can be renewed for up to 100 years. No changes are reported in the agreement document during monitoring period. The assignment agreement dates are detailed in Appendix I – Legal Agreements.
Forest Cover/GHG emission reduction	Surveillance	Deforestation, forest degradation and burn scars were monitored through	Deforestation/degradation was monitored using both satellite images and LiDAR covered

⁴ Backed up at OneDrive associated with a corporate Microsoft account.

⁵ Av. Cezira Giovanoni Moretti 655, sala 7 AgTech Garage Reserva dos Jequitibás, Piracicaba, São Paulo.

		satellite images and with ground truth verifications during this monitoring period. Land use change maps and orbital imagery collected from PRODES & DETER/INPE ⁶ , Mapbiomas ⁷ and ESA ⁸ .	area to detect natural and anthropogenic disturbances. The Satellite imageries from PRODES and DETER refer the period of July and August 2022. The LiDAR surveys has occurred in August and September 2022. All the data used was stored in “Appendix V – Monitoring” in which includes script codes for GEE and all spreadsheets for fires disturbances, deforestation from alert systems and the LiDAR degradation monitoring.
GHG emission reduction	Biomass Inventory	Biomass will be re-measured after the first baseline period, that is, with a 10-year interval. Carbon stock change in every pool will be estimated by stock difference method. As mentioned in section 2.2.4 – Project Description Deviations, for live Aboveground biomass in trees will be estimated through UAV-LiDAR surveys. Non-tree biomass component and below ground biomass on tree and non-tree component will be indirectly estimated through default values for conversion factors from peer-review studies. Dead wood and litter will be re-measured from direct measurement in the same permanent plots used to validate the LiDAR estimates. Estimates will be considered within a 90% confidence	No re-measured of included carbon pools has occurred during this monitoring period except the CAB_tree,i,j. The live tree aboveground was estimated through LiDAR surveys instead of field-based forest inventory. The flyover was applied in August 2022 from PAI#2-5 and from PAI#7-9 in September 2022. For carbon estimates with LiDAR rasters containing the Top Canopy Height variable and a LiDAR equations fitted with area-based method were used. The summary of procedures refers to section 3.2. All procedures are entirely described in Appendix IV folder, including all LiDAR products used in the analyses (rasters, shapefiles, spreadsheets, etc).

⁶ <http://terrabrasilis.dpi.inpe.br/>

⁷ <https://mapbiomas.org/>

⁸ <https://sentinels.copernicus.eu/web/sentinel/home>

		interval with a threshold error of 10%. New estimates shall take precedence over previous estimates where outside (i.e. greater than or less than) the 90% confidence interval of the previous estimates. For a complete description over forest biomass measurement methods check standard operational procedures (Appendix IV).	
Sustainable Forest Management	FSC Certification	Forest management operations can only take place in the project area if FSC certified. Annual investments to enhance forest management practices and adequate to FSC standard⁹ in almost all PAIs were implemented. The operations include training and direct investments in infrastructure, machinery, and equipment in a case-by-case basis. In this sense, necessary investments are a landowner's responsibility. FSC certification is a pre-condition for a specific PAI monitoring under the GPD. Internal audits against FSC Standard will be carried out to verify this project activity implementation before each verification event, with a maximum frequency of 05 years. Independent third-party audits will be performed annually to maintain FSC certification status of each PAI where copaibae forest management operations take	Potential non-timber forest products were initiated: Brazil nuts at Porongaba Farm (PAI#1 and PAI#4) and copaíba in Katianã and Potiguar. (PAI#2 and PAI#5). In addition, in November 2022 the landowner Batista & Cia obtained the FSC Forest Management seal for Conservation. See section 4.3.1 for more information.

⁹ FSC-STD-BRA-01-2001 v1.1

		place as valid.	
GHG emission reduction	Leakage mitigation	Potential activity shifting leakage were mitigated through advocacy with landowners within the project scope. The area of monitored activity shifting leakage and associated GHG emissions in each PAI, were summarized in a Table 44, section 3.2.3.	Net GHG emissions due to activity shifting leakage ($\Delta CLK-AS, planned$) is zero in the most part of the properties in the second monitoring period, once there are no deforested areas across these other lands managed by the identified deforestation agents disregarding the project boundary.
GHG emission reduction	Wildfire Prevention and Fire Fighting	We offered to communities living inside the project area a way to prevent wildfires to spread. Good management practices training has focus on risk control and mitigation measures. Firefighting training takes place for the formation of volunteer brigades. Wildfire can also be	We developed a fire alert monitoring system, based on Global Forest Watch which helps us control actions in relation to forest fires. Fire monitoring is found in Appendix V ("Monitoring 2 2022").

		prevented by firebreaks implementation. Finally, wildfires spread were prevented through fast brigade responses. In this sense, this project activity encompasses the implementation of monitoring towers with cameras capable of detecting smoke patterns automatically. These surveillance systems can detect fire in a 15Km ratio and warn the brigades leaders within 05 minutes from the fire start. The implementation of this system will depend on the volunteer brigade formation and on the implementation of an effective communication system in each PAI. Monitoring towers implementation will be reported in "activity reports.	
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3.1.3.1 Monitoring Of Actual Carbon Stock Changes, Ghg Emissions And Leakage

This monitoring task followed the VMD0015 v2.2 criteria, which provides methods for monitoring ex post emissions and removals of GHGs, due to deforestation, forest degradation, natural disturbances and carbon stock enhancement in the project area and leakage belt. The monitoring of actual carbon stock changes and GHG emissions is performed in tree steps:

3.1.3.2 Selection And Analyses Of Sources Of Land-Use And Land-Cover (Lu/Lc) Change Data

This project uses different sources of GIS for assessing land-use and land-cover change in the project area and leakage belt. To compose the initial data for the monitoring process, a set of deforestation and degradation alerts is used. For the annual quantification of the change in land use from the Forest class to the non-Forest class, the Brazilian Amazon Forest Satellite Monitoring Program (PRODES) is also used, under the responsibility of the National Institute for Space Research (INPE). To quantify the change in land use continuously on a weekly scale, as well as degradation activities, the Real-Time Deforestation Detection System (DETER) is used, also under the responsibility of INPE (INPE, 2019; Assis et al. 2019).

As a complementary alert system, the Global Forest Watch integrated monitoring system is used, consisting of three alert systems: GLAD (Hansen et al., 2016), GLAD-S2 (Pickens et al., 2020) and RADD (Reiche et al. 2021). Another system used is MapBiomass Alerta (MapBiomass Alerta Project, 2023), a compilation of data from several providers (e.g. INPE, IMAZON, University of Maryland, among others) validated with high-resolution images.

Fire degradation is also monitored using the Fire Information for Resource Management System (FIRMS), under the responsibility of NASA (National Aeronautics and Space Administration). This data distributes real-time active fire information from the Visible Infrared Imaging Radiometer Suite (VIIRS) aboard the S-NPP and NOAA20 satellites (Schroeder et al. 2014). These detections are stored weekly and intersected in the Project Areas and Leakage Belt. It is very important to note that this data provides fire alerts that allow us to monitor but does not allow us to quantify the area degraded by fire, it only indicates burning activity within a radius of 375 meters. Therefore, using satellite images from DETER data, the area of forest fires within the monitored areas is quantified. In this context, the fire area to be reduced in the biomass stock is measured.

Cartographic information is made available openly and free of charge on the web and is downloaded, stored, and organized on BRC cloud. Furthermore, to control and guarantee the quality of initial data alerts, we validate deforestation polygons with supervised interpretation using satellite images. The satellite images used to validate the initial data are obtained via Google Earth Engine, distributed by the responsible agencies with correction and normalization processing to extract surface reflectance data. The set of images used is composed of images from the Sentinel 2 satellites (MSI sensor, Multispectral Instrument), Landsat 9 (OLI-2 sensor, Operational Land Imager 2) and monthly mosaics from Planet NICFI (Norway's International Climate and Forests Initiative Satellite Data Program). The use of SAR (Synthetic Aperture Radar) images from Sentinel 1 is in the process of being implemented. Images from the CBERS 4A satellite (WFI sensor, Wide Field Camera), obtained from the INPE image catalogue, are also used.

3.1.3.3 Processing lu/lc change data

The monitoring system is structured to collect and process data from different sources, such as INPE, FIRMS, GFW and MAPBIOMAS, using the R language. After processing, the data was crossed with the monitored properties and stored. Alert validation occurs weekly, using satellite images manipulated via Google Earth Engine. The results are documented in partial, monthly and annual reports, which include georeferencing, quantification and visual validation of deforestation polygons (Figure 13).

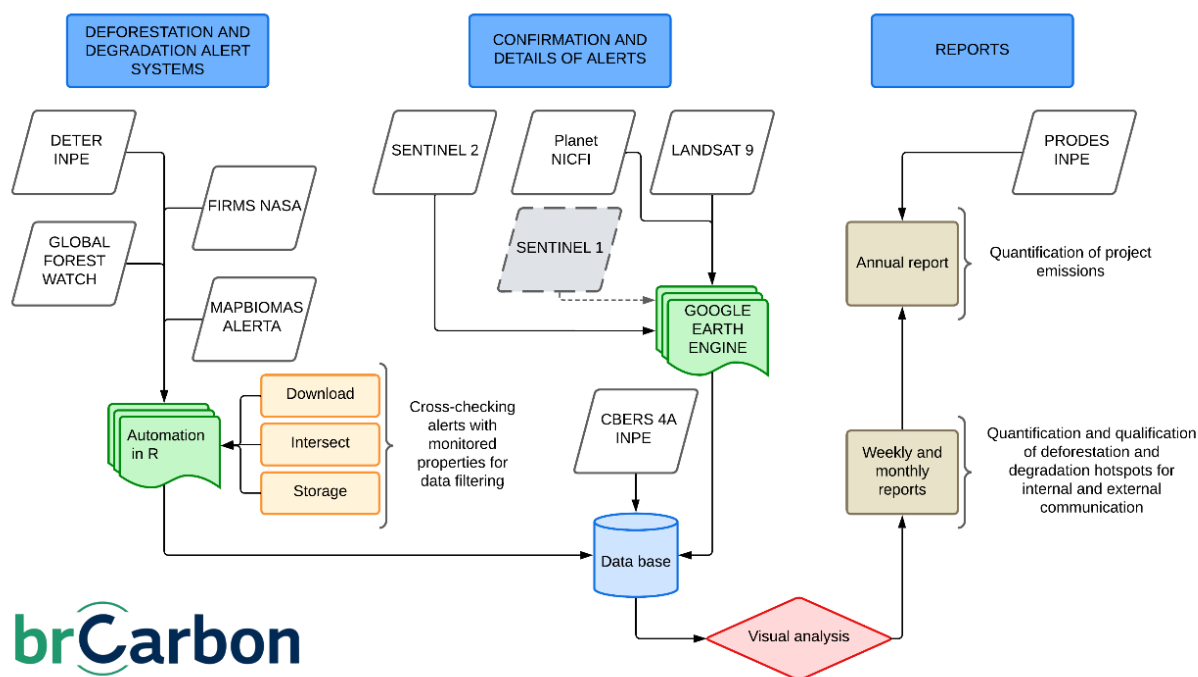


Figure 13. Flowchart of the monitoring system's technical procedures.

3.1.3.4 Post-Processing And Accuracy Assessment

The PRODES¹⁰ project data was used to monitor land use change in all the lands managed by the identified deforestation agent (including the project area and lands outside the project boundary). Forest cover benchmark maps were provided and updated as soon as the data was released by INPE.

Data from DETER services were used weekly to evaluate deforestation and forest degradation alerts (ADegW,i, ADistPA,i,t, Aburn,i,t). Burn scars from wildfires (Aburn,q,i,t) are measured according to ΔNBR $\Delta NBR47$ spectral index and verified with high spatial resolution satellite imagery from Sentinel based on Google Earth Engine platform, along with ground verifications. Alerts of deforestation and forest degradation were verified with visual analysis using satellite images. If deforestation is confirmed in the visual assessment and by PRODES data, they were used to estimate GHG emissions due to deforestation in the project area (ADefPA,i,u,t) or activity transfer leakage (ADefLK,i,u,t) in the project scenario. If DETER data is not confirmed by PRODES, but is verified with visual analysis using satellite images, it used to update forest cover reference maps and therefore also counted as deforestation in the project area or transfer leakage of activities in the project scenario. DETER data has high temporal resolution and lower spatial resolution than PRODES data, which makes it suitable for generating deforestation alerts, which

¹⁰ [Downloads – Terrabrazilis \(inpe.br\)](https://terraviva.org.br/pt-br/monitoramento-e-verificacao)

can be used to guide prompt BRC responses. Likewise, Global Forest Watch alerts are used for this purpose and with a better spatial resolution (10 m). The degraded forests detected up to the project start date were disregarded by the BRC when preparing the first forest benchmark map. In this sense, the maps are derived from the land use and land cover classification provided by Mapbiomas Collection 8 for the Amazon Biome. In this instance, the global accuracy¹¹ is approximately 96.8%.

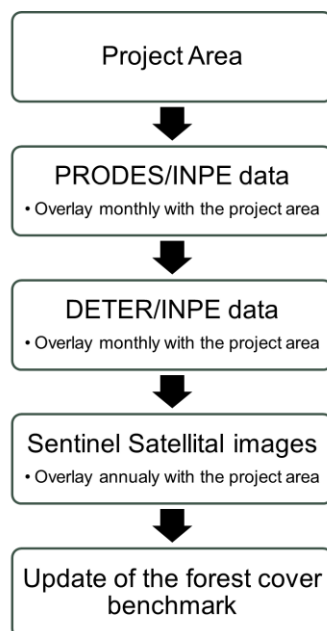


Figure 14. Monitoring steps flowchart.

3.1.3.5 Interpretation and analyses

PRODES data was used to monitor project area deforestation ($A_{DefPA,i,u,t}$) and activity shifting leakage ($A_{DefLK,i,u,t}$) in the project case. Net carbon stock change as a result of deforestation in the project case in the project area and leakage belt were calculated taking in consideration the net carbon stock changes in all pools in the project case ($\Delta C_{pools,Def,u,i,t}$), according to VMD0015 v2.2 equations 03 to 06 (see section 3.2.2.1) and VMD0009 v1.3 equations 01 to 07 (see section 3.2.2.2).

DETER data and supervised observation were used to monitor forest degradation ($A_{DegW,i}$, $A_{DistPA,i,t}$, $A_{burn,i,t}$) in the project case. Net carbon stock change as a result of degradation in the project area in the project case were calculated taking in consideration the extraction of trees for illegal timber or fuelwood and charcoal ($\Delta C_{P,DegW,i,t}$) and selective logging of FSC certified forest management areas ($\Delta C_{P,SelLog,i,t}$), according to VMD0015 v2.2 equations 07 to 18 (see section 3.2.2.1).

¹¹ [MapBiomas Global Accuracy](#)

An initial participatory rural appraisal (PRA) of the communities inside and surrounding the project area was performed to determine if there was the potential for illegal extraction of trees to occur. Considering GPD initial scope, it remained characterized that all families living inside the project area explore the forest for timber and fuel wood, what shall be considered as a low impact activity driven by subsistence purposes. No timber or fuel wood economic activity was perceived by BRC. In this sense, BRC assumed that extraction of trees for timber or fuelwood is a constant in PAIs where community presence is perceived. Rather than making a PRA every two years, BRC monitor the forest degraded area annually considering the protocols established in this monitoring plan. This constitutes a methodology deviation which leads to more accurate and conservative estimates since significance of timber and fuel wood extraction GHG related emissions will always be tested. This methodology deviation was reported in section 3.6. The degradation penetration is determined through field verifications. These techniques allow us to map forest gaps and draw the buffer area based on the access points.

The biomass carbon of trees cut and removed through degradation process (CDegW,i,t) were monitored through direct measure in PAIs #2-5 and validate using LiDAR surveys as reported in Appendix IV and Appendix V "Monitoring 2 2022". In the case FSC certified forest management operation is happening at a specific PAI, the volume of timber extracted (VEXT,j,z,i,t), the length and width of skid trails in stratum (LSKID,i,t, WSKID), the area of roads and logging decks (AROAD,i,t, ADECKS,i,t) will be taken from annual operating plans, exploration authorizations and post exploration reports. In this sense, no action of timber extraction will be taken along the project lifetime and not accounted during this monitoring period.

According to common practice in Amazonia, it is assumed that fire is used for land clearing after deforestation in the project area, in the baseline and project scenarios. Non-CO₂ emissions due to biomass burning are considered according to VMD0015 v2.2 equation 30 and VMD0013 v1.2, equation 01 and 02 (see section 3.2.2.1).

3.1.3.6 Data Archiving, Organization And Responsibilities

The monitoring report provided all relevant information on the time series of data on land use-change, and GHG emissions in the monitoring report, considering data sources and processing protocols, data classification and accuracy assessment, following VMD0015 v2.2. Digital files were stored in BRC database and archived at BRC headquarters. Security data protocol followed the most recent federal law for personal data privacy, including in digital media, by a natural person or legal entity governed by public or private law, with the aim of protecting the fundamental rights¹². In this sense, since beginning of 2022

¹² [L13709 \(planalto.gov.br\)](http://planalto.gov.br) – Law Nº 13,709, 14th August of 2018 (in Portuguese “Lei Geral de Proteção de Dados Pessoais (LGPD)”).

the BRC structured a technology of information team to enhance and implement two-step verification tasks, internal data security protocols and personal qualification routines as a concern of protecting corporate and personal data privacy.

BRC technical staff is headed exclusively by professionals with more than 10 years of experience in monitoring and certification of forest carbon projects. In addition, BRCarbon, operates with more than 30 professionals and technicians that cover Project Management, Social, Biology, Engineering, GIS, advocacy and Communication areas. Considering the monitoring tasks previously described, BRC headquarter structured a geospatial laboratory (called “LabGEO”). The responsibilities of the team involve multidisciplinary attributes such as:

- Definition of project boundaries and eligible areas
- Monthly deforestation alerts within project areas and leakage
- Development and enhancement of deforestation alert systems
- Supervised analysis of high-resolution satellite imageries classification for LU/LC process
- Detection of GHG emissions from wildfires
- Development of forest cover benchmark map and global accuracy of land changes classification.

For optimal quality control of processes, procedures is validated by an independent third part, a person distinct from the original analysts, from the same team or different team (this process is under development and validation). The role of this third part is to establish a systematic review of analysis quality, ensure accuracy, and offer guidance on reporting. Subsequently, the information is reported along with comprehensive historical calculation records and detailed documentation to facilitate reproduction by an external party outside BRC. For geospatial analyses and quantification of primary biomass stocks (carbon pools), available formats include: a) Appendices or reports documents outlining procedures and data characteristics used in the analysis, encompassing all statistical parameters and the required accuracy threshold (*.PPT, *.DOCX and *.XLSX file formats); b) Geospatial data essential for analysis, including codes applicable in the Google Earth Engine environment or written in the R language applied within the RStudio software (*.TIF for rasters, *.SHP for shapefiles and *.R for R script code). In this sense, the final products include spreadsheets in which access essential external raw data that feeds the calculation workflows and textual documents describing all the applied steps (Eg.: Appendix IV and V, calculus table spreadsheets for GHG emissions and monitoring of deforestation, respectively). To fill a gap, BRC has initiated the development of a database structure to enhance transparency in reporting and sharing information within a GISsql environment. Moreover, there is a preference for the use of open-source or

freely distributed software formats (e.g., QGIS, GEE, RStudio, etc.) and other formats of interactivity in R language analysis resembling a DMRV platforms (e.g. RMarkdown documents for LiDAR data analysis).

3.1.3.7 Estimation Of Ex-Post Net Carbon Stock Changes And Ghg Emissions

Ex-post estimates are performed according to the methodological procedures described in section 3.2. The technical description of the monitoring task and an overview of data collection procedures are described in section 3.2. All data collected are described in section 3.2, 3.1.1 and 3.1.2. Sections 3.1.1 and 3.1.2 also brings information on the applicable quality control and quality assurance procedures.

3.1.4 Dissemination of Monitoring Plan and Results (CL4.2)

The monitoring plan and monitoring results were available on Verra's website, through the GPD and monitoring reports full documents. In addition, the monitoring results were discussed in public meetings aimed at this purpose, held during the third and fourth social engagement stages.

3.2 Quantification of GHG Emission Reductions and Removals

This section refers to *ex-post* calculations for all instances under the currently verification. The initial of the second monitoring period for all instances is from 20th October 2021 until 31st December 2022, thus the vintages were divided in two: 2021 (20th October 2021 until 31st December 2021) and 2022 (1st January 2022 until 31st December 2022), according with the VCS registration and Issuance process v4.2, section 4.1.2.

3.2.1 Baseline Emissions

Baseline emissions are estimated according to VMD0006 v1.3. This module allows to estimate GHG emissions related to planned deforestation on forest lands that are legally authorized and documented to be converted to non-forest land. These areas would be deforested in the absence of the REDD project activity, and converted to pasture for cattle raising, as presented in section 3.5 of the registered GPD.

3.2.1.1 Deforestation in the Baseline Scenario

The area of deforestation (A_{planned,i}) for new PAIs was defined according to an immediate site-specific threat of deforestation, as stated on section 5.1.2 of VMD006, v1.4, which is demonstrated by documentary proof of the following:

- 1) Legal permissibility for deforestation:** the permissibility of deforestation is demonstrated for new PAIs through the application of environmental legislation in the country. According to the Brazilian forestry code (Law nº. 12,651 of May 25, 2012), rural properties in the Amazon biome need to preserve 80% of forest cover, which guarantees owners of rural properties the right to remove up to 20% of forest cover on their properties, for productive purposes.

- 2) **Suitability of project area for conversion to alternative non-forest land use:** To stabilize the project area limits in each new PAI (Aplanned,i), a series of operation in GIS environment were performed to determine the project area. First, the PRODES database was used to define remaining forest areas within the property limits. Furthermore, the project proponent carried out stages of review and redefinition of previously established limits, using high-resolution images from Sentinel. This way legal permissibility the area of allowed deforestation is considered relative to total property areas including areas already deforested. Data from the PRODES system is the official data used by the Brazilian government to determine forest cover and monitor deforestation in Brazilian biomes. They are produced by INPE (National Institute for Space Research), which is considered a scientifically recognized source of data¹³

Suitability of new PAIs for conversion to alternative non-forest land use is demonstrated by figure below:

PAI #6 is located 50 km from the municipal seat of Manicoré and the Madeira River, giving access to consumer centers such as Manaus (AM) and Porto Velho (RO), as well as being 150 km from two cattle-producing centers with Apuí and Humaitá, both in the south of Amazonas, the frontier of deforestation with high rates of deforestation for conversion into pasture. According to IBGE data (SIDRA, 2022), from 2018 to 2022 the municipality of Manicoré had a 15% increase in the number of head of cattle, from 115,000 to 134,500; and according to PRODES data between 2020-2022 the deforestation had an increase of 200%, as can be seen in the graph below, showing the expansion of deforestation and livestock farming in the region.

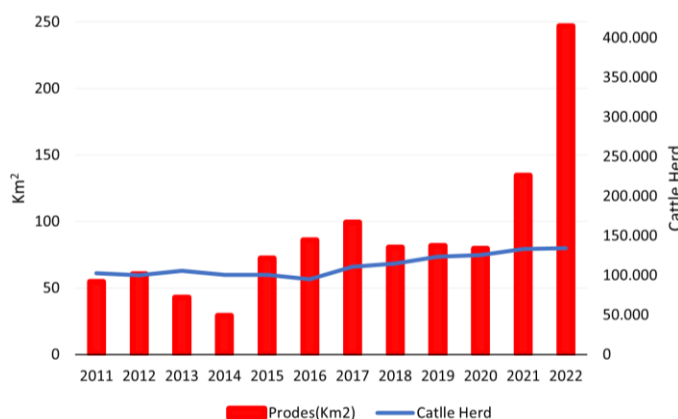


Figure 15. Deforestation and Cattle Herd in Manicoré (AM).

The PAIs #7 to #9 are in a former deforestation frontier region east of the state of Pará, where farming activities are established. According to the Pará State Government, this corresponds to a Consolidated

¹³ http://www.obt.inpe.br/OBT/assuntos/programas/amazonia/prodes/pdfs/kintish_2007.pdf

Zone with an installed infrastructure and support for transporting beef cattle production to meatpacking plants (article), as shown in the map:

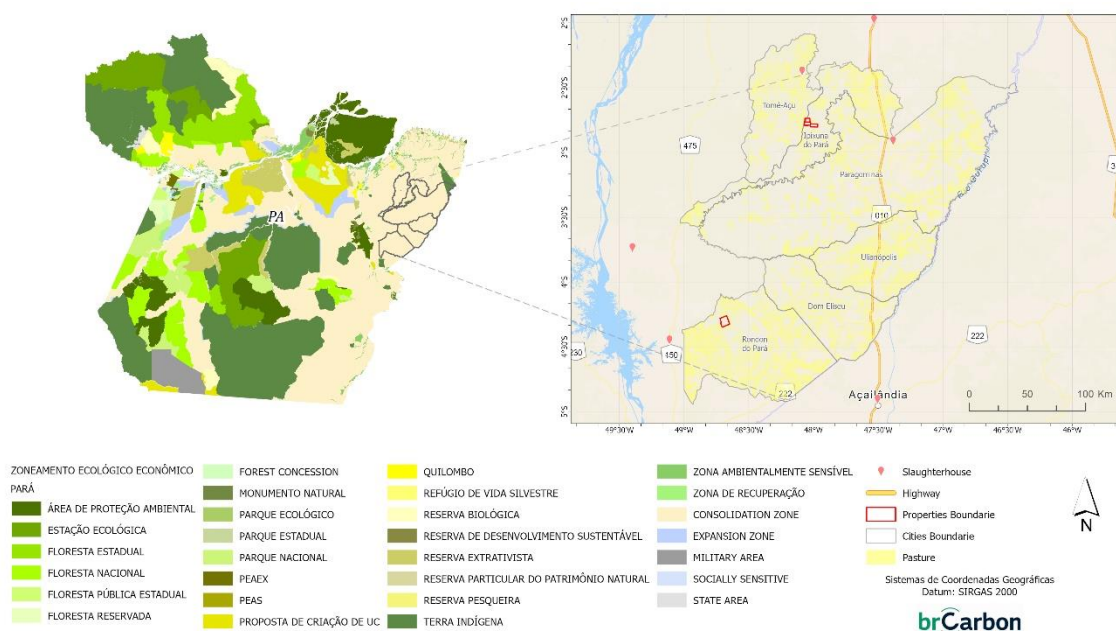


Figure 16. PAIs #7-9, deforestation frontier and consolidated zone.

The PAIs #7 to #9 are located in a former deforestation frontier region east of the state of Pará, where farming activities are established. According to the Pará State Government, this corresponds to a Consolidated Zone with an installed infrastructure and support for transporting beef cattle production to meatpacking plants (article), as shown in the map (figure 16).

As shown in Table 16 (Mapbiomas, 2022), it is possible to see how a considerable part of the municipalities where the projects are located are occupied by pasture, highlighting the importance of livestock farming in the region and the pressure that the remaining forests are under when converted to cattle farming.

Table 16. Pasture in Para region municipalities of PAIs #7-9.

Municipalities	Municipality area (ha)	Pasture area (ha)	%
Ipixuna do Pará	559,173.49	199,341.99	35%
Rondon do Pará	879,460.90	432,373.53	49.10%
Tomé-Açu	549,849.39	180,416.33	32.80%

3) Government approval for deforestation to occur is demonstrated for new PAIs through Recent approval from relevant government department (local to national) for conversion of

forest to an alternative land use; or Documentation that a request for approval has been filed with the relevant government department for permission to deforest and convert to alternative land use, according to the documentation presented in Annex IV_Baseline Scenario.

- 4) Intent to deforest** is demonstrated by the same documents that prove government approval for deforestation, showing the authorization for vegetation suppression or a request to carry out this suppression, as well as a documented history of similar planned deforestation activities by the deforestation agent within the five years prior to without-project deforestation. The project proponent has presented all relevant documents that corroborate the intent to deforest project areas or other properties of the same deforestation agent, as can be seen in Annex IV.

The annual area of baseline planned deforestation ($AA_{planned,i,t}$) was calculated according to VMD0006 BL-PL v1.3 equation 5. The table below shows the annual area of planned deforestation ($AA_{planned,i,t}$) over the baseline scenario in all PAIs for the second monitoring period. The table also presents the total area of planned deforestation, for each instance, over the fixed baseline period ($A_{planned,i,t}$), just as reference.

The rate at which deforestation is projected to occur for PAIs #1-5 comes from a valid verifiable plan ((Annex_IV_BaselineScenario). For PAIs #6-9, the rate of deforestation was determined according to the proxy areas approach, where six (6) proxy areas with recent government-approved vegetation suppression plans were selected. Based on the deforestation rate observed within these proxy areas, an annual deforestation rate of 34 % was established for PAIs #6-9 (Rate_of_deforestation). The similarity analyses of vegetation, slope, topography, and soil between the proxy areas and PAIs #6-9 for the definition of the deforestation rate, along with the shapefiles and other relevant information, can be found in Appendix_Rate_of_deforestation.

Table 17. Total and annual area of planned deforestation over the baseline scenario in PAIs #1-9 in the second monitoring period. (Table 44 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum	$AA_{planned,i,t}$	$A_{planned,t}$	$D\%_{planned,i,t}$
PAI #1	As	186.00	691.59	26.9%
	Ds	92.00	299.00	30.8%
PAI #2	Aa	0.00	822.07	0.0%
	Ab	404.00	3905.97	10.3%
PAI #3	Aa	247.00	682.46	36.2%
	Ab	247.00	3851.88	6.4%
PAI #4	Aa	249.00	800.54	31.1%
	Ab	249.00	3398.77	7.3%
PAI #5	Aa	249.00	1625.12	15.3%
	Ab	249.00	2587.92	9.6%
PAI #6	Db	2677.44	7874.82	34.0%
PAI #7	D	79.41	233.56	34.0%
PAI #8	D	15.01	44.15	34.0%
PAI #9	D	274.88	808.48	34.0%

3.2.1.2 Risk of Abandonment

The proxy areas were selected according to the conditions presented in section 5.1.3 of VMD006. The risk of abandonment is considered based on proxy areas by the same class of deforestation agent over a 10-year interval, as outlined in section 5.1.5 of VMD006. The selection of these areas utilized properties in the rural environmental registry located within the same municipality as the project property boundaries. Six proxy areas were selected in each region, totaling six for the PAI #6 region in Manicoré, Amazonas State, and thirty for the PAI #7 to PAI #9 region in Ipixuna do Pará, Tomé-Açu and Rondon do Pará in the Pará State. The maps display the location of proxy areas around PAIs and their similarity with the environmental factors (soil types, elevation, slope, forest types, and climate classification). The geographical proximity of these private properties demonstrates similar environmental conditions in the project property boundaries and proxy area the (maps are presented in the Appendix X_GIS data). Table 18 and Table 19 shows the similarity between proxy areas and the proprieties where the PAIs are located and compare the environmental factors (soil types, elevation, slope, forest types, and climate classification).

Table 18. Similarities between proprieties where the PAIs are located and proxy areas for the PAI #6 region, Manicoré in Amazonas State.

Soil types	Property boundaries		Proxy Areas	
	ha	%	ha	%
ESKo - Espodossolo Ferri-Humilúvico Órtico	6,023.25	15.21%	17.38	0.15%
LAd - Latossolo Amarelo Distrófico	33,587.14	84.79%	7,316.35	65.16%
PVAd - Argissolo Vermelho-Amarelo Distrófico	-	-	1,825.36	16.26%
PVAva - Argissolo Vermelho-Amarelo Ta Alumínico	-	-	2,068.38	18.42%
Total	39,610.39	100.00%	11,227.47	100.00%
Vegetation				
Open Ombrophylous Submontane Forest (As)	308.91	0.78%	8.08	0.07%
Dense Ombrophylous Forest of the Lowlands (Db)	35,476.98	89.56%	3,713.74	33.08%
Dense Ombrophylous Submontane Forest (Ds)	-	-	5,395.31	48.05%
Pioneer Formation with water influence (Pa)	3,824.50	9.66%	-	-
Livestock (pastures)	-	-	2,110.34	18.80%
Total	39,610.39	100.00%	11,227.47	100.00%
Climate				
Am – Tropical	39,610.39	100.00%	11,227.47	100.00%
Total	39,610.39	100.00%	11,227.47	100.00%
Elevation				
< 50	3,636.20	9.18%	1.52	0.01%
50-100	35,972.27	90.82%	3,863.83	34.41%

100-150	-	-	6,916.33	61.60%
150-200	-	-	403.74	3.60%
200-250	-	-	42.08	0.37%
250-300	-	-	-	-
Total	39,608.47	100.00%	11,227.50	100.00%
Slope				
Plan	13,029.23	32.90%	2,236.55	19.92%
Smooth Wavy	20,601.95	52.01%	5,914.14	52.68%
Wavy	5,717.05	14.43%	2,695.67	24.01%
Strong wavy	260.02	0.66%	376.30	3.35%
Mountainous	0.22	-	4.83	0.04%
Steep	-	-	-	-
Total	39,608.47	100.00%	11,227.50	100.00%

Table 19. Similarities between proprieties where the PAIs are located and proxy areas from the PAI #7 to PAI #9 region in Ipixuna do Pará, Dom Eliseu, Tomé-Açu, Paragominas, and Rondon do Pará in the Pará State.

Soil types	Property boundaries		Proxy Areas	
	ha	%	ha	%
FFc - Plintossolo Pétrico Concrecionário	391.02	1.25%	12,884.36	11.40%
GXbd - Gleissolo Háplico Tb Distrófico	802.30	2.57%	443.67	0.39%
LAd - Latossolo Amarelo Distrófico	23,691.17	75.78%	71,771.82	63.51%
PAe - Argissolo Amarelo Eutrófico	4,615.36	14.76%	17,009.92	15.05%
PVAd - Argissolo Vermelho-Amarelo Distrófico	1,762.95	5.64%	10,902.66	9.65%
Total	31,262.79	100.00%	113,012.43	100.00%
Vegetation				
Open Ombrophylous Submontane Forest (As)	-	-	91.08	0.08%
Dense Alluvial Ombrophylous Forest (Da)	-	-	818.14	0.72%
Dense Ombrophylous Forest of the Lowlands (Db)	14,929.78	47.76%	27,674.18	24.48%
Dense Ombrophylous Submontane Forest (Ds)	14,185.96	45.38%	36,394.09	32.19%
Secondary Vegetation (Vs)	118.68	0.38%	1,573.51	1.39%
Livestock (pastures)	2,028.36	6.49%	41,748.95	36.93%
Agriculture	-	-	4,747.33	4.20%
Total	31,262.79	100.00%	113,047.28	100.00%
Climate				
Am – Tropical	26,214.25	83.85%	58,862.48	52.07%

Aw – Tropical	5,050.16	16.15%	39,674.41	35.09%
Af – Tropical	-	-	14,516.65	12.84%
Total	31,264.41	100.00%	113,053.54	100.00%
Elevation				
< 50	722.26	2.31%	12,764.25	11.29%
50-100	17,021.86	54.44%	41,711.82	36.90%
100-150	7,697.94	24.62%	21,752.36	19.24%
150-200	5,278.42	16.88%	19,212.54	16.99%
200-250	534.32	1.71%	8,600.37	7.61%
250-300	9.61	0.03%	7,055.17	6.24%
300-350	-	-	1,946.15	1.72%
350-400	-	-	10.80	0.01%
Total	31,264.41	100.00%	113,053.47	100.00%
Slope				
Plan	6,111.90	19.55%	23,192.33	20.51%
Smooth Wavy	15,426.97	49.34%	52,508.42	46.45%
Wavy	8,429.09	26.96%	30,805.43	27.25%
Strong wavy	1,284.67	4.11%	6,236.22	5.52%
Mountainous	11.79	0.04%	308.06	0.27%
Steep	-	-	3.02	-
Total	31,264.41	100.00%	113,053.47	100.00%

Figure 17 and Figure 18 shows the land cover transitions and historical deforestation and degradation in the period analyzed and allow us to conclude that the deforested areas are not abandoned in the region. The time series shows the increase of pasture at the landscape scale. All maps compare the land use and transitions in the years 2011 and 2021 showing an increase in the pasture (anthropic) area and spatial evidence in low intensity of recovery of secondary forests.

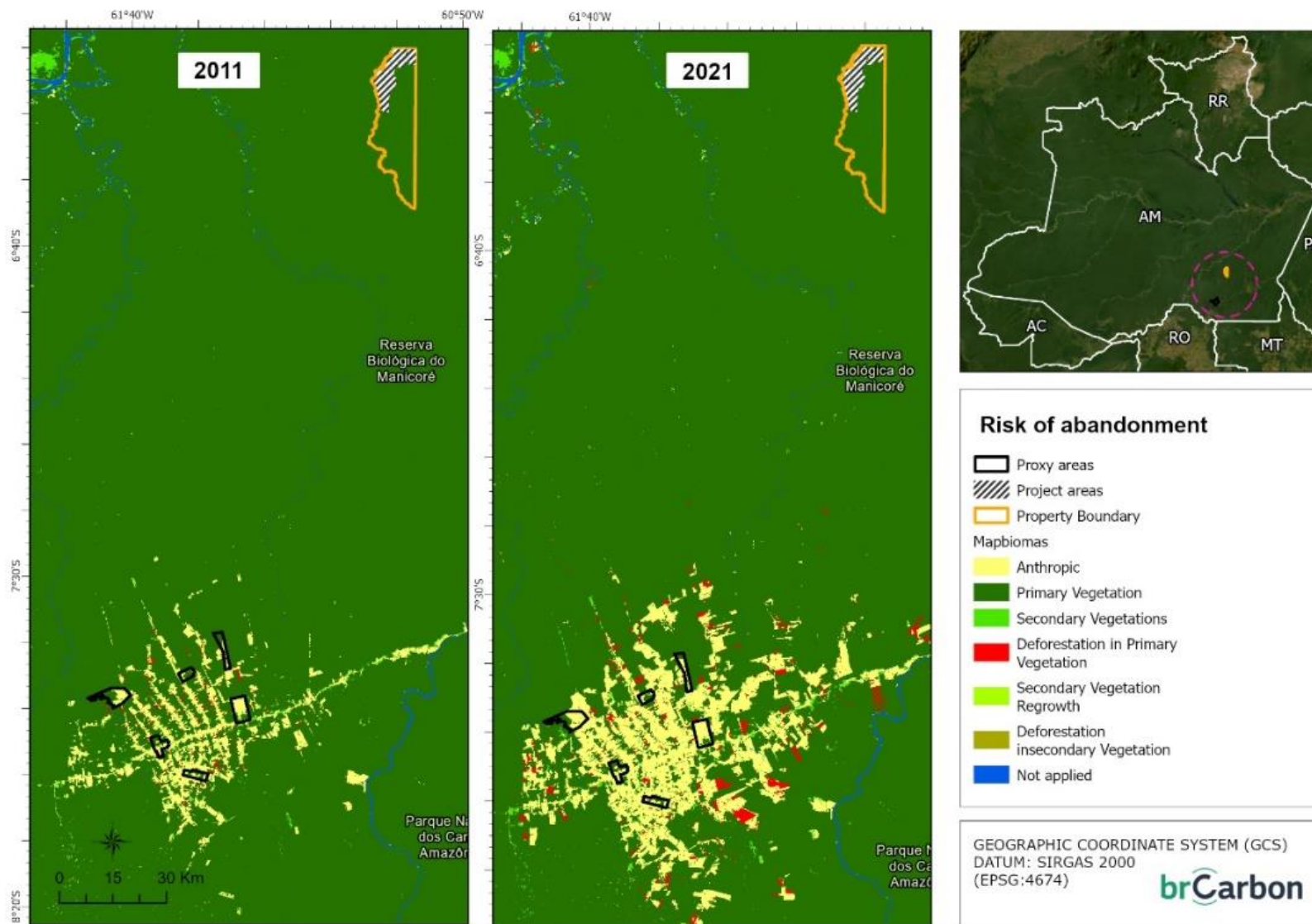


Figure 17. Mapbiomas land use transitions in proxy areas and project property boundaries for the PAI #6 region, Manicoré in Amazonas State.

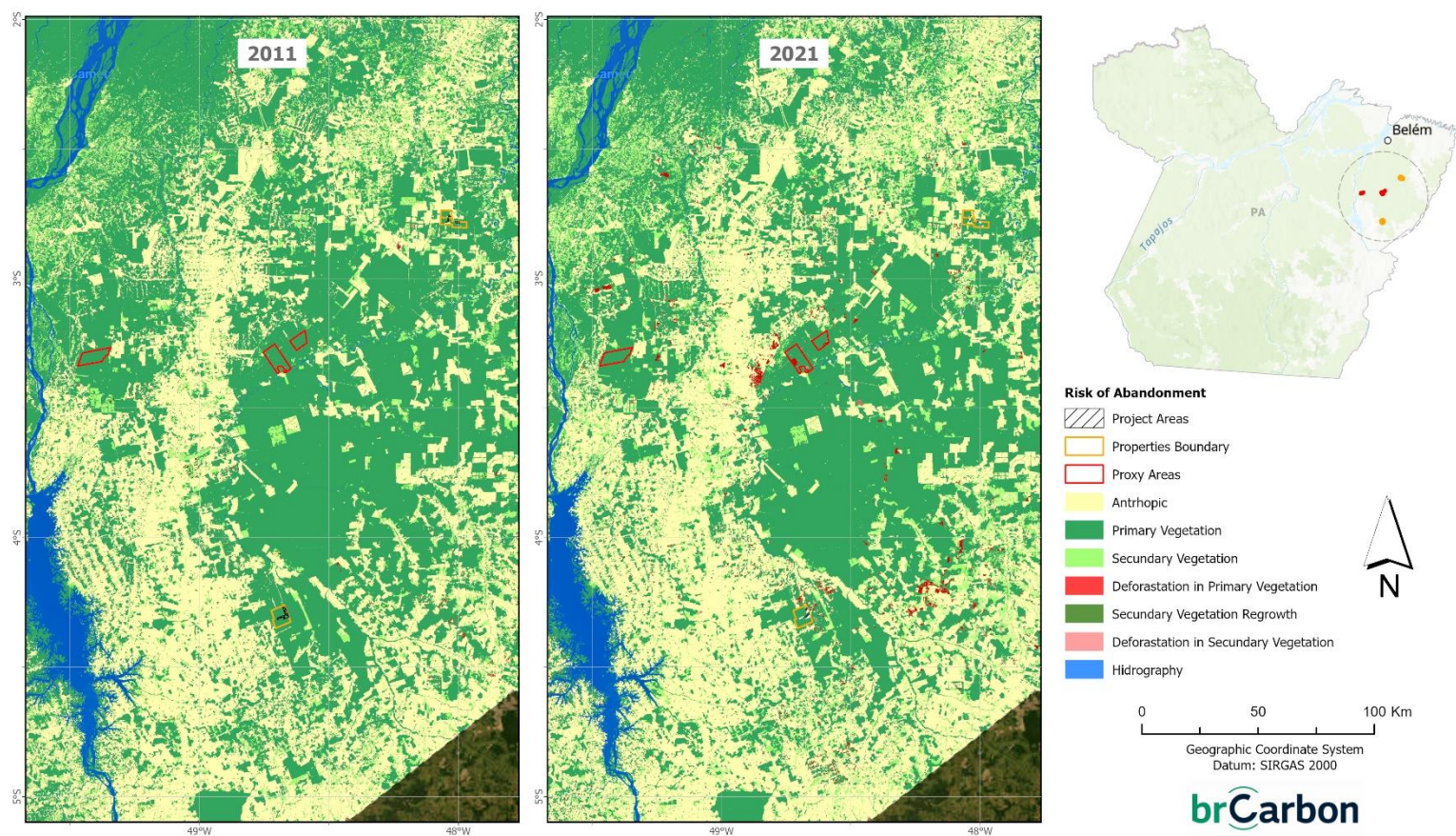


Figure 18. Mapbiomas land use transitions in proxy areas and project property boundaries for the PAI #7 to PAI #9 region in Ipixuna do Pará, Dom Eliseu, Tomé-Açu, Paragominas, and Rondon do Pará in the Pará State.

Table 20 and Table 21 display the information extracted from the maps for the proxy areas and project property boundaries. The **Error! Reference source not found.** show an increase in the pasture (anthropic) area and spatial evidence of low-intensity recovery of secondary forests in the PAI #6 region, Manicoré, in the Amazonas State. On the other hand, the PAI #7 to PAI #9 region, which includes Ipixuna do Pará, Tomé-Açu and Rondon do Pará in the Pará State, exhibits an increase in Secondary Vegetation (Table 20). However, this data does not indicate a risk of abandonment, many properties in the Pará state have an environmental legal responsibility to recompose the legal reserve according to the Brazilian Forestry Code. An evaluation conducted by the Remote Sensing Center at the Federal University of Minas Gerais (UFMG) reveals that 3.74 million hectares were designated for legal reserve recovery in 2022. Consequently, areas with restored vegetation are classified as secondary vegetation in Mapbiomas products.

Table 20. Mapbiomas land use transitions in proxy areas and project property boundaries for the PAI #6 region, Manicoré in Amazonas State.

Deforestation and Regeneration		2011		2021	
		ha	%	ha	%
Property boundaries	Anthropic	-	-	-	-
	Primary Vegetation	39,605.54	99.99%	39,605.01	99.99%
	Secondary Vegetation	2.93	0.01%	2.93	0.01%
	Deforestation in Primary Vegetation	-	-	-	-
	Secondary Vegetation Regrowth	-	-	-	-
	Deforestation in Secondary Vegetation	-	-	-	-
	Not Applied	-	-	0.53	-
Total		39,608.47	100.00%	39,608.47	100.00%
Proxy Areas	Anthropic	5,556.40	49.49%	7,022.78	62.55%
	Primary Vegetation	5,302.42	47.23%	3,861.78	34.40%
	Secondary Vegetation	237.90	2.12%	212.65	1.89%
	Deforestation in Primary Vegetation	56.60	0.50%	78.63	0.70%
	Secondary Vegetation Regrowth	30.40	0.27%	-	-
	Deforestation in Secondary Vegetation	29.05	0.26%	18.80	0.17%
	Not Applied	14.74	0.13%	32.86	0.29%
Total		11,227.50	100.00%	11,227.50	28.35%

Table 21. Mapbiomas land use transitions in proxy areas and project property boundaries for the PAI #7 to PAI #9 region in Ipixuna do Pará, Tomé-Açu, and Rondon do Pará in the Pará State.

Deforestation and Regeneration		2011		2021	
		ha	%	ha	%

Property boundaries	Anthropic	771.37	2.47%	874.28	2.80%
	Primary Vegetation	29,431.03	94.14%	29,095.53	93.06%
	Secondary Vegetation	1,011.11	3.23%	1,166.90	3.73%
	Deforestation in Primary Vegetation	1.61	0.01%	26.58	0.09%
	Secondary Vegetation Regrowth	16.63	0.05%	-	-
	Deforestation in Secondary Vegetation	6.26	0.02%	54.17	0.17%
	Not Applied	26.40	0.08%	46.96	0.15%
Total		31,264.41	100.00 %	31,264.41	100.00 %
Proxy Areas	Anthropic	50,420.12	44.60%	50,713.45	44.86%
	Primary Vegetation	52,113.52	46.10%	47,306.97	41.84%
	Secondary Vegetation	8,659.29	7.66%	13,625.85	12.05%
	Deforestation in Primary Vegetation	201.40	0.18%	717.88	0.63%
	Secondary Vegetation Regrowth	1,167.20	1.03%	-	-
	Deforestation in Secondary Vegetation	340.29	0.30%	543.24	0.48%
	Not Applied	151.64	0.13%	146.08	0.13%
Total		113,053.47	100.00 %	113,053.47	100.00 %

3.2.1.3 Carbon stock Change per Reservoir in the Baseline Scenario

3.2.1.3.1 Aboveground Tree Biomass

The baseline carbon stock change in aboveground tree biomass ($\Delta C_{AB_tree,i}$) was calculated according to the difference between the forest carbon stock in aboveground tree biomass ($C_{AB_tree,bsl,i}$) and the post-deforestation carbon stock in aboveground tree biomass ($C_{AB_tree,post,i}$), according to VMD0006 v1.3, equation 6.

Forest carbon stock in aboveground tree biomass ($C_{AB_tree,bsl,i}$) is estimated through field inventory and UAV-Lidar survey, the detailed methodologies are described below. Post-deforestation carbon stock in aboveground tree biomass ($C_{AB_tree,post,i}$) is taken from peer reviewed literature (Silva Neto et al., 2012).

Table 22. Carbon stock change in aboveground tree biomass (t CO₂e ha⁻¹). (Table 15 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum (i)	$C_{AB_tree,bsl,i}$	$C_{AB_tree,post,i}$	$\Delta C_{AB_tree,i}$
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PAI #1	As	456.37	0.11	456.26
	Ds	447.34	0.11	447.23
PAIs #2-5	Aa	370.05	0.11	369.94
	Ab	402.11	0.11	402.00
PAI #6	Db	463.85	0.11	463.74
PAIs #7-9	D	543.76	0.11	543.65

Field inventory

A stratified sampling was conducted for the allocation of plots or Sampling Units (SU) within the Project Area (PA) of each instance. The biomass measurement and estimation protocol followed the Option 1 method - Fixed Area and the use of an allometric equation, as suggested by the VMD0001 v1.1 CP-AB tool (VCS, 2013). A total of 60 SUs was allocated in PAI #1, 65 in PAIs #2-5, 62 in PAI #6 and 104 in PAIs #7-9. Each transect presents the SUs arranged in a straight line and spaced 100m apart. The SUs are rectangular in shape and measure 20 x 60 meters, covering an area of 1,200 m². All sampling units were georeferenced using a Garmin GPSmap 62sc navigation GPS, ensuring easy access for future location and remeasurement. Within each SU, the carbon stocks contained in the following components were measured: Aboveground living trees (thick and thin); Belowground living trees (thick and thin); Aboveground non-tree; Belowground non-tree; Dead trees (standing and fallen); Litter; and Soil Organic Carbon

Aboveground Living Trees (Thick and Thin)

For the Thick Living Trees (TLT) component, the Diameter at Breast Height (DBH) was measured for all living trees located within the SUs, when equal to or greater than 10 cm. All sampled individuals were identified with numbered plates and marked with red paint at the DBH Measurement Point (MP) for monitoring and future remeasurement. For the measurement of the Thin Living Trees (TLT) component, two sub-samples were allocated, each measuring 10 x 10 meters, totaling a sample area of 200 m² (as shown the following picture). The allocation of these sub-samples was standardized at the beginning of the SU on the right side, and at the end of the SU on the left side. For the TLT component, only living and thin individuals in the following diameter range were counted and measured: 5 < DBH < 10 cm. All sampled individuals were identified with numbered plates and marked with red paint at the DBH Measurement Point (MP) for monitoring and future remeasurement.

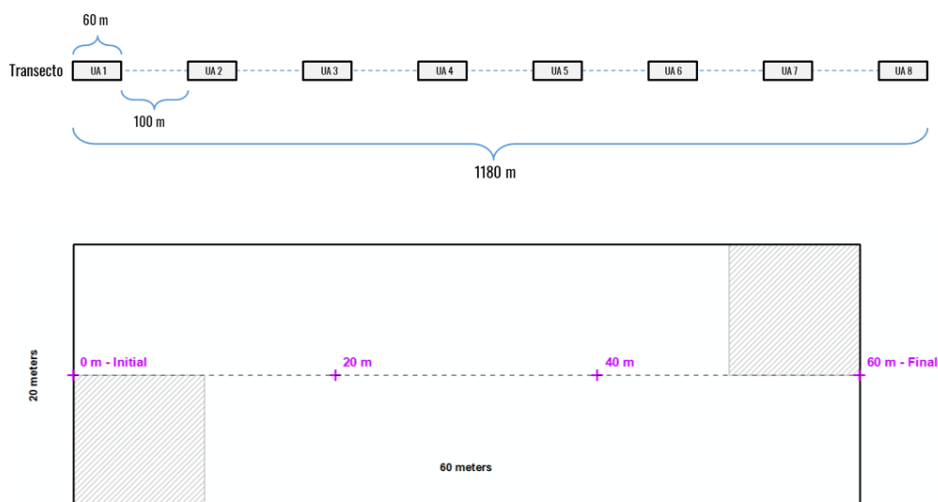


Figure 19. Inventory methodology transects and 20X60 m plots.

Above: representation of the 1180m transect made up of 8 sampling units (SU) positioned along a central road and 100m apart. Below: Representation of the SU with a rectangular shape and dimensions of 20x60m (1200m²) for measuring the Thick Living Trees. Hatched are the two 10x10m (100m²) subsamples for measuring the Thin Living Trees reservoir. The dotted black line illustrates the central path for walking and the subdivision of the AU into right and left sides. The purple highlighted points illustrate the spatial sub-delimitation of the samples geo-referenced with navigation GPS.

The equation below presents the selected allometric model and the respective statistical parameters for estimating the individual aboveground dry biomass in the AVG (Thick Living Trees) and AVF (Thin Living Trees) tree reservoirs.

$$AGB_{est} = \exp (-1.803 - 0.976E + 0.976 \ln(\rho) + 2.673 \ln(D) - 0.0299[\ln(D)]^2)$$

The variable E refers to the environmental factor that takes into account the climate, soil, and altitude of the study site, and can be consulted at: http://chave.ups-tlse.fr/pantropical_allometry.htm. For the variable ρ , referring to wood density, the scientific article by Fearnside et al. (1997, "Wood density for estimating forest biomass in Brazilian Amazonia") was used, which indicates average wood density values for different states and physiognomies present in the Amazon Forest. For converting dry biomass to carbon content, the parameter Carbon Fraction = 0.485 (Nogueira, 2008 – "Estimates of forest biomass in the Brazilian Amazon") was used. Mode details can be found in Appendix IV. The number of sample units from field-based forest inventory per each PAI and forest classes is presented below.

Table 23. Summary of sample units based on forest inventory for biomass estimates for all included carbon pools.

Instance	Stratum (i)	Number of Sample Units (SU)
PAI #1	As	30
	Ds	30
PAIs #2-5	Aa	33
	Ab	32
PAI #6	Db	62
PAIs #7-9	D	104
TOTAL		315

UAV-LiDAR survey

The use of UAV-LiDAR significantly increases the accuracy of carbon estimates. Beyond the precision of these estimates, the sampling power of LiDAR far exceeds that of field sampling. For instance, the inventory area in the Project Activity Instances (PAIs) surveyed by LiDAR was approximately 17 hectares (144 plots), whereas the area sampled by UAV-LiDAR reached nearly 2,500 hectares, covering 5-81% of the PAIs' area.

For the collection of LiDAR data, we employed the 'DJI Zenmuse L1' sensor mounted on the 'DJI Matrice 300' UAV. The flight planning was conducted using the 'UgCS Enterprise' software, where the parameters for the flights were set at an altitude of 120 meters with a 70% overlap between LiDAR collection strips. For the geolocation correction of the data, we used Post-Processed Kinematic (PPK) processing, adjusting the latitude, longitude, and altitude based on the location of the 'DJI D-RTK 2 GNSS Mobile Station'. The point clouds were pre-processed using the 'DJI Terra' software. From these point clouds, we produced Canopy Height Models (CHM) with a resolution of 1-meter pixels, utilizing the *lidR* package (Russel et al., 2020) in the RStudio statistical environment. The flight paths were planned to overlap the areas where the Sampling Units (SUs) were allocated.

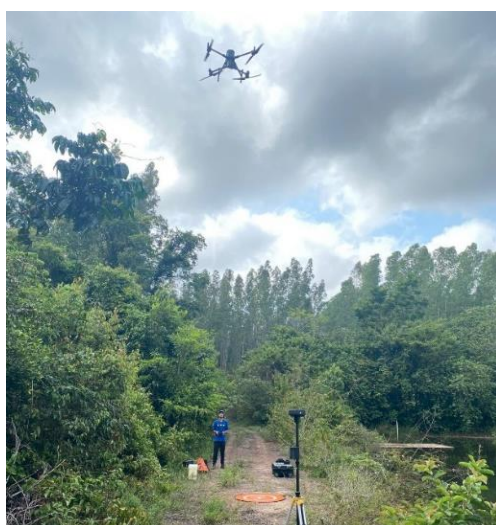


Figure 20. LiDAR data collection using drone.

LiDAR estimates PAIs #2-5

From the CHMs, we generated the Top Canopy Height (TCH) metric, calculated as the average of the pixels in a 35 square meter area, closely resembling the area of the SUs. To generate the carbon maps, we employed the equation from Longo et al. (2016 – “Aboveground biomass variability across intact and degraded forests in the Brazilian Amazon”), a leading reference in remote sensing of Amazon Forest biomass, as published in a peer-reviewed scientific article. The carbon maps and CHM for each instance can be found in Appendix IV.

To accurately calculate and validate the LiDAR-based estimates with field inventory data, we conducted a resampling process with 1000 iterations. In each iteration, 100 pixels from each forest class were randomly sampled, simulating 1000 inventories of 100 plots/samples each. For each iteration, the average of the samples from each physiognomy and its uncertainty were calculated. Furthermore, to validate the LiDAR estimates, the relative difference between the field inventory estimates and the LiDAR-based estimates was calculated in each iteration. Thus, in each iteration, the Mean of the samples, the Standard Deviation, the Uncertainty, and the Relative Difference when compared with the field inventory values were calculated.

In adopting a conservative approach, considering that Longo et al. (2016) used a factor of 0.500 to calculate the equivalent carbon amount in forest biomass, we performed a conversion step to use a factor of 0.485. Additionally, as Longo et al.'s equation considered the non-tree component, we conducted another step to subtract the 10.7% pertaining to this component. Finally, we converted the data from kg C/m² to tCO₂e/ha. More details can be found in Appendix IV.

LiDAR estimates PAIs #7-9

Three model structures were tested and validated, including a non-linear model (similar used by Longo et al. (2016)), which involves the premise that the error distribution (ϵ) is described by a proportionality function, and that the variance is not constant as a function of the mean, assuming that the error is heteroscedastic. Using the summarized data of dry biomass from field plots of living trees, both thin (AVF) and thick (AVG), the average of canopy height model (“Top-Canopy-Height” - TCH) was used as an input variable. The model was evaluated through two selection stages. First, we assessed the performance of the model by the coefficient of determination (R^2) and the root mean square error (RMSE). Finally, we validated their generalization capability through the leave-one-out cross-validation (LOOCV) procedure. LOOCV involves dividing the dataset on which the model was fitted with k-1 observations and validated with the observation that was removed at the time of fitting. This procedure is repeated in an iterative process considering the total number of observations in the database. Thus, the relationship between the observed and predicted value (obs ~ pred) by LOOCV was evaluated to a correspondence that the null hypothesis of our regression has a 1:1 ratio, where the intercept

and slope (angular coefficient) are statistically equal to 0 and 1 respectively. More details can be found at the Appendix IV.

From LiDAR model, maps with carbon estimates were generated from the TCH, considering the entire area flown over by the UAV-LiDAR system. The rasters of carbon maps can be checked in Appendix IV. Thus, it was possible to obtain maps with an approximate resolution of 35m, in order to make it compatible with the same area used in the field plots (60mx20m). Each pixel is equivalent to a field plot from the conventional inventory. At this stage, a buffer of 10 was applied to the carbon layers (derived from LiDAR data) to remove edge pixels. The calculations were applied from the useful area that considers maps after this removal, as well as the removal of pixels below the minimum value and above the maximum value of TCH computed in the model. From these maps, simulations were carried out in a resampling process with 1000 iterations, where in each iteration 128 samples were extracted with replacement (128 pixels) and their respective average estimates as well as the uncertainty of tCO₂e ha⁻¹. The justification for this number of samples is to follow the same logic of the total number of SUs installed in the field, in order to obtain different scenarios of similar proportion. To validate the efficiency of the model estimates from the approach with LiDAR metrics, we evaluated the relative difference of the estimates obtained with the field plot data and used the methodology for calculating uncertainties (n > 30) suggested by the IPCC (2006b), at a 90% confidence level. Details can be found in Appendix IV.

3.2.1.3.2 Belowground Tree Biomass

The baseline carbon stock change in belowground tree biomass ($\Delta C_{BB_tree,i}$) was calculated according to the difference between the forest carbon stock in belowground tree ($C_{BB_tree,bsl,i}$) and the post-deforestation carbon stock in belowground tree biomass ($C_{BB_tree,post,i}$), according to VMD0006 v1.3, equation 8.

Forest carbon stock in belowground tree biomass ($C_{BB_tree,bsl,i}$) is calculated through root-to-shoot ratios taken from peer reviewed literature (Nogueira et al., 2008). Post-deforestation carbon stock in belowground tree biomass ($C_{BB_tree,post,i}$) is taken from peer reviewed literature (Silva Neto et al., 2012).

Table 24. Baseline carbon stock change in belowground tree biomass (t CO₂e ha⁻¹). (Table 16 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum (i)	$C_{BB_tree,bsl,i}$	$C_{BB_tree,post,i}$	$\Delta C_{BB_tree,i}$
PAI #1	As	45.64	0.02	45.61
	Ds	138.68	0.02	138.65
PAIs #2-5	Aa	37.01	0.02	36.98
	Ab	40.21	0.02	40.19
PAI #6	Db	143.79	0.02	143.77
PAIs #7-9	D	168.57	0.02	168.55

3.2.1.3.3 Aboveground Non-Tree Biomass

The baseline carbon stock change in aboveground non-tree biomass ($\Delta CAB_{non-tree,i}$) was calculated according to the difference between the forest carbon stock in aboveground non-tree biomass in stratum I ($CAB_{non-tree,bsl,i}$) and the post-deforestation carbon stock in aboveground non-tree biomass in stratum I ($CAB_{non-tree,post,i}$), according to VMD0006 v1.3, equation 7.

Forest carbon stock in aboveground non-tree biomass ($CAB_{non-tree,bsl,i}$) is estimated according to peer reviewed literature (Nogueira et al., 2008). Palms and vines are considered to represent 1.9% and 3.4% of the aboveground tree biomass in dense tropical forests, respectively, and 8.6% and 10.7% of the aboveground tree biomass in open tropical forests, respectively. Post-deforestation carbon stock in aboveground tree biomass ($CAB_{non-tree,post,i}$) is taken from peer reviewed literature (Silva Neto et al., 2012).

Table 25. Baseline carbon stock change in aboveground non-tree biomass (t CO₂e ha⁻¹). (Table 17 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum (i)	$CAB_{non-tree,bsl,i}$	$CAB_{non-tree,post,i}$	$\Delta CAB_{non-tree,i}$
PAI #1	As	48.83	15.00	33.83
	Ds	23.71	15.00	8.71
PAIs #2-5	Aa	39.60	15.00	24.60
	Ab	43.03	15.00	28.03
PAI #6	Db	24.58	15.00	9.59
PAIs #7-9	D	28.82	15.00	13.82

3.2.1.3.4 Belowground Non-Tree Biomass

The baseline carbon stock change in belowground non-tree biomass ($\Delta C_{BB_non-tree,i}$) was calculated according to the difference between the forest carbon stock in belowground non-tree ($C_{BB_non-tree,bsl,i}$) and the post-deforestation carbon stock in belowground non-tree biomass ($C_{BB_non-tree,post,i}$), according to VMD0006 v1.3, equation 9.

Post-deforestation carbon stock in belowground non-tree biomass ($C_{BB_non-tree,post,i}$) is calculated through root-to-shoot ratios taken from peer reviewed literature (Silva Neto et al., 2012).

Table 26. Baseline carbon stock change in belowground non-tree biomass (t CO₂e ha⁻¹). (Table 18 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum (i)	$C_{BB_non-tree,bsl,i}$	$C_{BB_non-tree,post,i}$	$\Delta C_{BB_non-tree,i}$
PAI #1	As	9.77	3.00	6.77
	Ds	4.74	3.00	1.74
PAIs #2-5	Aa	7.92	3.00	4.92
	Ab	8.61	3.00	5.61
PAI #6	Db	4.92	3.00	1.92
PAIs #7-9	D	5.76	3.00	2.76

3.2.1.3.5 Deadwood

The baseline carbon stock change in deadwood ($\Delta C_{DW,i}$) was calculated according to the difference between the forest carbon stock in deadwood ($C_{DW,bsl,i}$) and the post-deforestation carbon stock in deadwood ($C_{DW,post,i}$), according to VMD0006 v1.3 equation 10.

Forest carbon stock in dead wood ($C_{DW,bsl,i}$) was estimated based on field measurements of fixed area plots, considering standing dead trees and lying dead wood, according to VMD0002 v1.0 criteria. Biomass estimation for standing deadwood or Trees in Mortality Process (TMP) followed Option 1, utilizing the allometric equation from VMD0002 v1.1 CP-AB (VCS, 2013). Sampling followed the protocol for AVG trees component within 1200 m² units, recording trees with DBH of 10 cm or larger, measuring DBH, and tagging. For deadwood, maximum height and trunk decomposition degree were measured.

Two sampling methods were suggested for two classes of standing deadwood: i) initial stage individuals and ii) intermediate-advanced stage individuals. No individuals were classified in the initial stage due to identification difficulty. Standing dead trees were identified using a machete test and visual inspection. Wood densities and decomposition stages were considered for biomass estimation. The line interception method was used for lying dead trees. Fallen deadwood was classified by decomposition stage, and densities from literature were used.

The carbon stock of lying dead trees was estimated using the traditional line interception method (Van Wagner, 1968; VCS, 2010). Two 50-meter lines were established within the same Sampling Units (UAs) as those used for measuring living trees. Fallen dead trees with a diameter ≥ 10 cm were measured at the point of interception along these lines. The first line was positioned in alignment with the central axis of the field-based sample plots, while the second line was placed perpendicularly midway (25 meters) from the primary line.

The decomposition stage of woody material was classified as advanced or incipient. Density values for the decomposing material were determined using literature data relevant to tropical humid forests and the southern Amazon biome. Densities of fallen wood for different decomposition classes were 0.49 g*cm⁻³, 0.41 g*cm⁻³, and 0.34 g*cm⁻³ for initial, intermediate, and advanced stages of decomposition, respectively (Cummings et al., 2002). A specific equation was applied to estimate standing and fallen deadwood volume per sampling unit (see details in Appendix IV - Carbon Pools).

Post-deforestation carbon stock in deadwood ($C_{DW,post,i}$) is set as zero as the project area is expected to be submitted to fire as part of the deforestation process. Fire is typically used as an instrument for clearing areas by deforestation agents in the Brazilian Amazon, acting by reducing the tree density due to mortality and eliminates the lower forest strata, facilitating subsequent access and forest cleaning ([Barlow et al., 2012](#); [Furtado Lima et al. 2024](#)). [Furtado Lima et al. \(2024\)](#), for example, used data of fire alerts and deforestation from two public domain and free data sources (PRODES and BDQueimadas) over the last 20 years to evaluate the relationship between fire and deforestation in Amazonia and found a high correlation ($R^2 > 0.7$) between the

two events throughout the time series, indicating the existence of a spatial relationship between fire and deforestation in the region.

Table 27. Baseline carbon stock change in dead wood biomass of PAIs #1-9 (t CO₂e ha⁻¹). (Table 19 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum (i)	C _{DW,bsl,i}	C _{DW,post,i}	ΔC _{DW,i}
PAI #1	As	34.29	-	34.29
	Ds	22.40	-	22.40
PAIs #2-5	Aa	14.20	-	14.20
	Ab	8.60	-	8.60
PAI #6	Db	31.54	-	31.54
PAIs #7-9	D	39.03	-	39.03

3.2.1.3.6 Litter

The baseline carbon stock change in litter (ΔC_{LI,i}) was calculated according to the difference between the forest carbon stock in litter (C_{LI,i}) and the post-deforestation carbon stock in litter in stratum I (C_{LI,post,i}), according to VMD0006 v1.3 equation 11.

Forest carbon stock in litter (C_{LI,bsl,i}) is estimated based on field measurements of fixed area plots, according to VMD0003 v1.0 criteria. The estimation of biomass in the litter pool encompassed all above-ground vegetal material, including leaves, fruits, and dead branches below 10 cm in diameter. Sampling units mirrored those used for tree pools, with careful attention to stratification and sampling intensity. Litter samples were collected at the periphery of each unit to avoid disturbance, using a fixed sketch with PVC pipes to delineate sample areas of 1 x 1 meter. Four samples per unit were weighed for wet biomass, with one sample reserved for laboratory analysis after drying at room temperature for a week. Subsamples were taken for dry biomass determination, excluding ambient water, using a Perkin Elmer Model 2400 elemental analyzer and sent to the laboratory for carbon content analysis.

The dry biomass of litter provided the basis for estimating total carbon content as a percentage for each sample. This protocol for carbon stock measurement adhered to VMD0003 v1 CP-L guidelines, with applied equation for the calculation of average carbon dioxide equivalent (CO₂e) stock of the litter reservoir by stratum (see details in Appendix IV - Carbon Pools).

Post-deforestation carbon stock in litter (C_{LI,post,i}) is also set as zero as the project area is expected to be submitted to fire as part of the deforestation process.

Table 28. Baseline carbon stock change in litter pool of PAIs #1-9 (t CO₂e ha⁻¹). (Table 20 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum (i)	$C_{LI,bsl,i}$	$C_{LI,post,i}$	$\Delta C_{LI,i}$
PAI #1	As	19.06	-	19.06
	Ds	24.16	-	24.16
PAIs #2-5	Aa	9.49	-	9.49
	Ab	9.64	-	9.64
PAI #6	Db	24.16	-	24.16
PAIs #7-9	D	13.96	-	13.96

3.2.1.3.7 Soil Organic Carbon (SOC)

The baseline carbon stock change in soil organic carbon ($\Delta_{SOC,i}$) was calculated according to the difference between the forest carbon stock in soil organic ($C_{SOC,bsl,i}$) and the post- deforestation carbon stock in soil organic carbon ($C_{SOC,PD-BSL,i}$), according to VMD0006 v1.3 equation

Forest carbon stock in soil organic carbon ($C_{SOC,bsl,i}$) is estimated based on field measurements of fixed area plots, according to VMD0004 v1.0 criteria. Estimates of soil Organic Carbon Content followed the tree Forest Inventory's sample design, considering two distinct strata and forest typologies. The protocol, suggested by VMD0004_v1.0_CP_S, guided measurement in this reservoir. For soil C analysis, samples were taken with hand augers or soil augers, averaging 5 holes per 1 m² area for each depth. Two soil samples (0-20 cm and 20-40 cm) were collected per Sampling Unit (UA), totaling 256 samples. Samples were air-dried for a week and analyzed in the laboratory using a Perkin Elmer Model 2400 elemental analyzer. Soil density was calculated from samples taken with a cylindrical tube from 0-40 cm depth. Samples were stored, labeled, air-dried, and weighed for dry mass. From the dried soil biomass, total C content, in percentage, was estimated for each sample following VMD0004_v1.0 CP-S guidelines. Thus, equation was used to determined average C content stock, and converted C content into equivalent carbon dioxide (CO₂e) (see details in Appendix IV - Carbon Pools).

The assessment of post-deforestation carbon stock in soil organic carbon ($C_{SOC, PD-BSL, i}$) relies on field measurements conducted using standardized protocols consistent with those employed for forest classes in PAIs #1 to #6. Additionally, for PAIs #7 to #9, the methodology is grounded in a peer-reviewed paper by Damian et al. (2021). For further details regarding the sampling design, adopted allometric equations, and related Standard Operating Procedures (SOPs), please consult Appendix 07, section 12.

Table 29. Baseline carbon stock change in soil organic carbon pool of PAIs #1-9 (t CO₂e ha⁻¹). (Table 21 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum (i)	$C_{SOC,bsl,i}$	$C_{SOC,PD-BSL,i}$	$\Delta C_{SOC,i}$
PAI #1	As	75.58	104.25	-28.68
	Ds	77.20	121.21	-44.01
PAIs #2-5	Aa	120.11	104.25	15.86
	Ab	120.00	121.21	-1.21
PAI #6	Db	84.72	104.25	-19.53

PAIs #7-9	D	146.98	164.05	-17.07
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3.2.1.3.8 Wood Products

Baseline carbon stock change in wood products ($C_{WP,i}$) is calculated through direct volume extraction estimation, according to VMD0005 v1.1 equation 2.

Table 30. Baseline carbon stock change in carbon wood products carbon pool of PAIs #1-9 (t CO₂e ha⁻¹). (Table 22 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum (i)	$C_{WP,i}$	$C_{WP100,i}$
PAI #1	As	0	0
	Ds		
PAI #2	Aa	0	0
	Ab		0
PAIs #3-5	Aa		
	Ab		
PAI #6	Db		
PAIs #7-9	D		

3.2.1.4 Carbon Stock Change in All Pools in the baseline Scenario

The net carbon stock changes in all pools in the baseline ($\Delta C_{BSL,i,t}$) was calculated according to equation 13 from VMD0006 v1.3. The table below shows the net carbon stock changes in all pools in the baseline in all PAIs for the second monitoring period:

$$\begin{aligned} \Delta C_{BSL,i,t} = & AA_{planned,i,t} \times (\Delta C_{AB_{tree,i}} - \Delta C_{WP,i} + \Delta C_{AB_{non-tree,i}} + \Delta C_{LI,i}) \\ & + \left(\sum_{t=10}^t AA_{planned,i,t} \right) \times (\Delta C_{BB_{tree,i}} + \Delta C_{BB_{non-tree,i}} + \Delta C_{DW,i}) * \left(\frac{1}{10} \right) \\ & + \left(\sum_{t=20}^t AA_{planned,i,t} \right) \times (C_{WP100,i} + \Delta C_{SOC,i}) * \left(\frac{1}{20} \right) \end{aligned}$$

Where:

$\Delta C_{BSL,i,t}$: Sum of the baseline carbon stock change in all terrestrial pools in stratum i in year t, t CO₂-e.

$AA_{planned,i,t}$: Annual area of baseline planned deforestation for stratum i in year t; ha

$C_{WP100,i}$: Carbon stock entering the wood products pool at the time of deforestation that is expected to be emitted over 100-years from stratum i; t CO₂-e ha⁻¹.

$\Delta C_{AB_{tree,i}}$: Baseline carbon stock change in aboveground tree biomass in stratum i; t CO₂-e ha⁻¹.

$\Delta C_{BB_{tree,i}}$: Baseline carbon stock change in belowground tree biomass in stratum i; t CO₂-e ha⁻¹.

$\Delta C_{AB_non-tree,i}$: Baseline carbon stock change in aboveground non-tree biomass in stratum i;
tCO₂-e ha⁻¹

Table 31. Net carbon stock changes in all pools in the baseline period in PAIs #1-9 (t CO₂-e) in the second monitoring period. (Table 45 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	$\Delta C_{BSL,i,t}$
PAI #1	144,154
PAI #2	181,972
PAI #3	214,214
PAI #4	215,948
PAI #5	215,948
PAI #6	1,376,829
PAI #7	46,980
PAI #8	8,881
PAI #9	162,624
Total	2,567,551

3.2.1.5 Non-CO₂ Emissions in the Baseline Scenario

The greenhouse gas emissions as a result of deforestation activities within the project boundary is estimated according to VMD0006 v1.3 equation 15 and VMD0013 v1.2, equations 1 and 2.

The table below shows the greenhouse gas emissions as a result of deforestation activities within the project boundary in all PAIs for the second monitoring period. For all purposes, the annual area of planned deforestation ($AA_{planned,i,t}$) is considered as burned ($A_{burn,i,t}$) for GHG emission estimates in the baseline scenario, following the common practice of deforestation agents in the region (slash and burn).

Table 32. Non-CO₂ emissions in the baseline case in all PAIs (t CO₂-e) in the second monitoring period. (Table 46 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum	$A_{burn,i,t}$
PAI #1	As	186
	Ds	92
PAI #2	Aa	-
	Ab	404
PAI #3	Aa	247
	Ab	247
PAI #4	Aa	249
	Ab	249
PAI #5	Aa	249

	Ab	249
PAI #6	Db	2,677
PAI #7	D	79
PAI #8	D	15
PAI #9	D	275
GHGBSL,E		165,969.05

3.2.1.6 Net GHG emissions in the Baseline Scenario

The baseline net GHG emissions for planned deforestation is determined according to VMD0006 BL-PL v1.3 equation 1. The table below shows the net GHG emissions for planned deforestation in all pools in the baseline in all PAIs for the second monitoring period:

Table 33. Net GHG emissions in the baseline from planned deforestation in PAIs #1-9 in the second monitoring period (t CO₂-e). (Table 47 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	$\Delta C_{BSL,planned}$
PAI #1	153,485
PAI #2	193,503
PAI #3	227,855
PAI #4	229,700
PAI #5	229,700
PAI #6	1,466,561
PAI #7	50,040
PAI #8	9,459
PAI #9	173,215
Total	2,733,520

3.2.2 Project Emissions

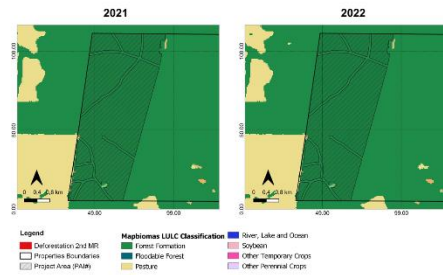
3.2.2.1 Project Forest Cover Benchmark Map

To demonstrate this parameter in the monitoring report for the period from October 20, 2021, to December 31, 2022:

The monitoring report for this period includes a map illustrating the forested areas within the project site at the beginning of each monitoring period. Any forested areas that have been cleared within the project site during this monitoring period are highlighted in the benchmark map for each monitoring event.

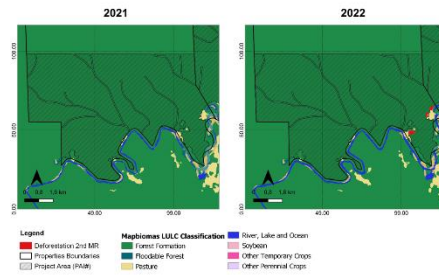
Benchmark Map PAI#01

brCarbon



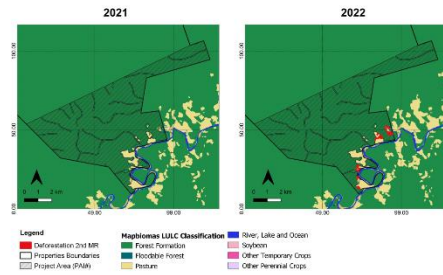
Benchmark Map PAI#02

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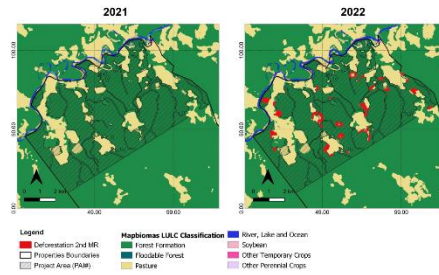
Benchmark Map PAI#03

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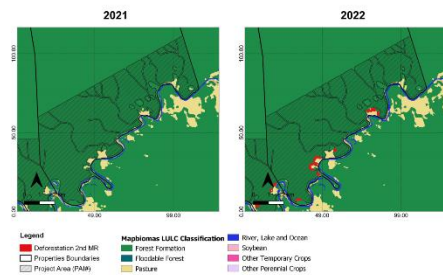
Benchmark Map PAI#04

brCarbon



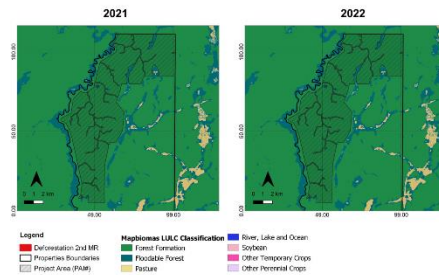
Benchmark Map PAI#05

brCarbon



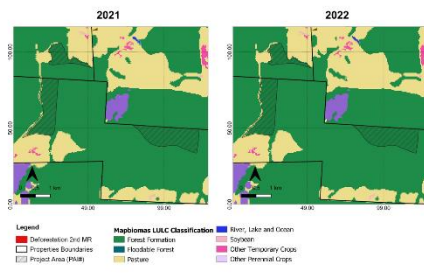
Benchmark Map PAI#06

brCarbon



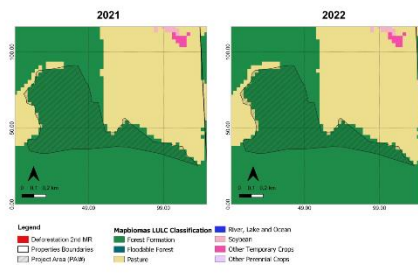
Benchmark Map PAI#07

brCarbon



Benchmark Map PAI#08

brCarbon



Benchmark Map PAI#09

brCarbon

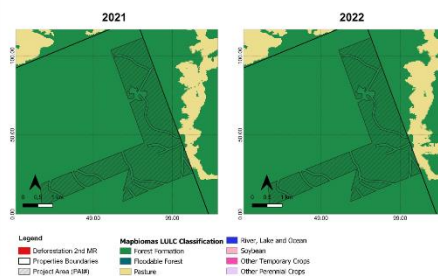


Figure 21. Project Forest Cover Benchmark Map at PAIs #1-9

3.2.2.2 Project Emissions in Second Monitoring Period

The area of recorded deforestation was measured through DETER data and supervised interpretation of high spatial resolution satellite imagery from PRODES (see section 3.1.2 of Monitoring Plan). The net GHG emissions in the project case is equal to the sum of stock changes due to deforestation and forest degradation plus the total GHG emissions, minus any eligible forest carbon stock enhancement, according to VMD0015 v2.2, equation 01 (see section 4.2.5 of the validated PD). All PAI were monitored during the second monitoring period as presented in the table below.

Table 34. Net GHG emissions in the REDD project scenario in the period monitored, for all instances where deforestation has occurred, up to year t^* (t CO₂-e) (ex-post). (Table 48 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum (i)	$\Delta C_{P,DefPA,i,t}$	$\Delta C_{P,Deg,i,t}$	$\Delta C_{P,DistPA,i,t}$	GHG _{P-E,i,t}	$\Delta C_{P,Enh,i,t}$	$\Delta C_{WPS-REDD}$
PAI #1	As	-	-	-	-	-	-
	Ds	-	-	-	-	-	-
PAI #2	Aa	3,427.13	9,799.28	-	-	-	13,226.41
	Ab	24.64	3,996.98	-	-	-	4,021.63
PAI #3	Aa	13,251.55	132.60	6,056.30	385.91	-	19,826.36
	Ab	-	12.50	158.43	10.22	-	181.14
PAI #4	Aa	15,046.03	1,384.42	2,625.83	167.32	-	19,223.60
	Ab	42,138.79	-	22,132.78	1,427.40	-	65,698.97
PAI #5	Aa	12,699.40	1,918.97	2,655.57	169.21	-	17,443.16
	Ab	-	-	-	-	-	-
PAI #6	Db	-	-	-	-	-	-
PAI #7	D	-	-	-	-	-	-
PAI #8	D	-	-	-	-	-	-
PAI #9	D	-	-	-	-	-	-

Carbon stock enhancement is conservatively assumed to be zero in all strata, following VMD0015 v2.2 step 02 criteria.

3.2.2.3 Deforestation in the Project Scenario

The area of recorded deforestation was measured through DETER data and visual interpretation of high spatial resolution satellite imagery from Sentinel. Only PAI #2, PAI #4 and PAI #5 had activity data regarding the deforestation. The PAI #1 and PAIs #6-9 hadn't any activity data regarding this monitoring aspect. The areas values identified are presented in the table below.

Table 35. Deforestation monitored in the project area in the second monitoring period (ex-post) for PAIs #1-9 (ha). (Table 49 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum	ADefPA,u,i,t
PAI #1	As	-
	Ds	-
PAI #2	Aa	7.20
	Ab	0.05
PAI #3	Aa	27.84
	Ab	-
PAI #4	Aa	31.61
	Ab	85.50
PAI #5	Aa	26.68
	Ab	-
PAI #6	Db	-
PAI #7	D	-
PAI #8	D	-
PAI #9	D	-

The net carbon stock change because of deforestation in the project area in the project scenario is calculated according to VMD0015 v2.2, equation 03. The table below presents the net carbon stock change because of deforestation in the project area in the project scenario in the second monitoring period:

Table 36. Net carbon stock change because of deforestation in the project case in the monitoring period (ex-post) (t CO₂-e). (Table 50 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	$\Delta C_{P,DefPA,i,t}$
PAI #1	-
PAI #2	3,451.77
PAI #3	13,251.55
PAI #4	57,184.83
PAI #5	12,699.40
PAI #6	-
PAI #7	-
PAI #8	-
PAI #9	-
Total	86,587.55

3.2.2.4 Forest Degradation in the Project Scenario

3.2.2.4.1 TIMBER, FUELWOOD AND CHARCOAL COLLECTION IN THE PROJECT SCENARIO

The area of forests subjected to degradation due to timber, fuel wood and charcoal collection was defined through a 1 Km buffer ratio from each family house location in every community in PAIs #2-5 where the project

areas have communities inside their boundaries. Forest degradation through timber, fuel wood and charcoal collection was disregarded in PAI #1 and PAI #6 to PAI #9, because no communities live in these areas.

Stumps were counted and measured in 8 sample plots A Pi (transects of 100 0mx40m) representing 2.07 % of $A_{degW,i}$. Biomass carbon of cut and removed trees from measured plots was estimated through the same allometric equations used to determine the above ground biomass in the tree component.

Net carbon stock changes as a result of degradation ($\Delta C_{P,DegW,i,t}$) was calculated according to VMD0015 v2.2, equation 08 and determined insignificant based on T SIG, second monitoring period. The table below presents the area impacted by degradation processes of logging.

Table 37. Area impacted by degradation processes in stratum in the second monitoring period (ex-post) (ha). (Table 52 from Appendix II – Calculus tables – 01 INTEGRATED CALCULUS TABLE).

Instance	Stratum (i)	$A_{DegW,i}$
PAI #1	As	-
	Ds	-
PAI #2	Aa	410.69
	Ab	167.51
PAI #3	Aa	387.27
	Ab	36.51
PAI #4	Aa	449.22
	Ab	676.84
PAI #5	Aa	649.74
	Ab	30.21
PAI #6	Db	-
PAI #7	D	-
PAI #8	D	-
PAI #9	D	-

Table 38. Biomass carbon of trees cut and removed through degradation process from measured plots in stratum i in year t in the second monitoring period (ex-post) (t CO₂-e). (Table 53 from Appendix II – Calculus tables – 01 INTEGRATED CALCULUS TABLE).

Instance	Stratum (i)	$C_{DegW,i,t}$
PAI #1	As	-
	Ds	-
PAI #2	Aa	90.67
	Ab	90.67
PAI #3	Aa	4.02
	Ab	4.02
PAI #4	Aa	48.55
	Ab	-
PAI #5	Aa	48.55
	Ab	-
PAI #6	Db	-
PAI #7	D	-
PAI #8	D	-
PAI #9	D	-

Table 39. Net carbon stock change as a result of degradation in the project case in the second monitoring period (ex-post) (t CO₂-e). (Table 54 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	$\Delta C_{P,DegW,i,t}$
PAI #1	-
PAI #2	13,796.26
PAI #3	145.10
PAI #4	1,384.42
PAI #5	1,918.97
PAI #6	-
PAI #7	-
PAI #8	-
PAI #9	-
Total	17,245

3.2.2.4.2 SELECTIVE LOGGING IN THE PROJECT SCENARIO

GHG emissions due to selective logging in the project scenario were zero. No forest management operations were held in any project instance in the second monitoring period. Ex-post estimates were done based on the GHG emissions arising in the logging gap, logging infrastructure and the carbon stock in wood products pool, according to VMD0015 v2.2, equation 09 (see section 4.2.2.2 of the validated PD)

3.2.2.5 Natural Disturbance in the Project Scenario

The area impacted by natural disturbance ($ADistPA,q,i,t$) is monitored and measured according to DETER database associated with direct observations. The area impacted by natural disturbance is proportionally reduced to reflect previous firewood/charcoal extraction (DDRF), in ex post estimates, according to VMD0015 v2.2, equation 19 (see section 4.2.3 of the validated PD). In the case the natural disturbance monitored is also related to wildfires, the area of natural disturbance is equal to the sum of the areas of all burn scars perceived in an annual basis, following VMD0015 v2.2, equations 22 and 21.

Only PAI #3, PAI #4 and PAI #5 had activity data regarding the natural disturbances. The PAIs #1-2 and PAIs #6-9 didn't have any activity data regarding this monitoring aspect. The disturbed areas identified per PAI are presented in the table below.

Table 40. Area impacted by natural disturbances (ex post) (ha). (Table 66 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance/Stratum		A _{DistPA,q,i,t}
DDRF		
PAI #1	As	-
	Ds	-
PAI #2	Aa	-
	Ab	-
PAI #3	Aa	14.46
	Ab	0.36
PAI #4	Aa	6.27
	Ab	50.01
PAI #5	Aa	6.34
	Ab	-
PAI #6	Db	-
PAI #7	D	-
PAI #8	D	-
PAI #9	D	-

Carbon stock changes in all pools as a result of natural disturbance (CP,Dist,q,i) is calculated according to VMD0015 v2.2, equation 24. Net carbon stock changes in pools because of natural disturbance is calculated according to VMD0015 v2.2, equation 23.

Net carbon stock change resulting from areas undergoing natural disturbance are calculated according to VMD0015 v2.2, equation 20. Data calculated for the PAIs which had activity data in the second monitoring period are presented in the table below.

Table 41. Net carbon stock change as a result of natural disturbance in the project case in the project area in stratum i in year t (t CO₂-e ha⁻¹) (ex post). (Table 67 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum (i)	A _{DistPA,q,i,t}	ΔC _{P,Dist,q,i,t}	ΔC _{P,DistPA,i,t}
PAI #1	As	-	482.67	-
	Ds	-	516.76	-
PAI #2	Aa	-	418.86	-
	Ab	-	442.53	-
PAI #3	Aa	14.46	418.86	6,056.30
	Ab	0.36	442.53	158.43
PAI #4	Aa	6.27	418.86	2,625.83
	Ab	50.01	442.53	22,132.78
PAI #5	Aa	6.34	418.86	2,655.57
	Ab	-	442.53	-
PAI #6	Db	-	544.30	-
PAI #7	D	-	662.81	-
PAI #8	D	-	662.81	-
PAI #9	D	-	662.81	-

3.2.2.6 Non-CO₂ Emissions in the Project Scenario

Burn scars from wildfires ($A_{burn,q,i,t}$) are measured according to ΔNBR $\Delta NBR47$ spectral index and verified with high spatial resolution satellite imagery from Sentinel, along with ground verifications (see section 4.2.3 of the validated PD).

Only PAI #3, PAI #4 and PAI #5 had activity data regarding the burned areas. The PAIs #1-2 and PAIs #6-9 didn't have any activity data regarding this monitoring parameter. The burned areas values identified are presented in the table below.

The average aboveground biomass stock before burning ($B_{i,t}$) is calculated according to VMD0013 v1.2, equation 2 (see section 4.2.4 of the validated PD). Non-CO₂ emissions due to biomass burning are calculated according to VMD0013 v1.3, equation 1 (see section 4.2.4 of the validated PD). Data calculated for the second monitoring period is presented in the table below.

Table 42. Greenhouse gas emissions due to biomass burning in stratum i in year t of each GHG (CO₂, CH₄, N₂O) (t CO₂e). (Tables 68, 69 and 70 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Instance	Stratum (i)	$A_{burn,i,t}$	$B_{i,t}$	COMFi	$E_{biomassburn,i,t}$
PAI #1	As	186.00	314.09	0.45	-
PAI #1	Ds	92.00	291.06	0.45	-
PAI #2	Aa	-	243.67	0.45	-
PAI #2	Ab	404.00	260.57	0.45	-
PAI #3	Aa	247.00	243.67	0.45	385.91
PAI #3	Ab	247.00	260.57	0.45	10.22
PAI #4	Aa	249.00	243.67	0.45	167.32
PAI #4	Ab	249.00	260.57	0.45	1,427.40
PAI #5	Aa	249.00	243.67	0.45	169.21
PAI #5	Ab	249.00	260.57	0.45	-
PAI #6	Db	2,047.45	305.98	0.45	-
PAI #7	D	60.73	351.77	0.45	-
PAI #8	D	11.48	351.77	0.45	-
PAI #9	D	210.20	351.77	0.45	-

GHG emissions from fossil fuels and nitrogen application were conservatively excluded following VM0007 v1.6, table 06, criteria. Non CO₂ emissions due to biomass burning in stratum i in year t ($E_{BiomassBurn,i,t}$) is equal to Greenhouse gas emissions as a result of deforestation activities within the project area in the project case in stratum i in year t GHG $P_{E,i,t}$.

3.2.2.7 Leakage (ex-post)

GHG emissions due to leakage are based on activity shifting and market effects leakage throughout the project lifetime. Leakage emissions are determined according to VM0007 v1.6 equation 4 (see section 4.3 of the validated PD). Data calculated for the second monitoring period is presented in the table below.

Table 43. Net GHG emissions due to leakage from the REDD project activity (t CO₂-e) (ex-post). (Table 71 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

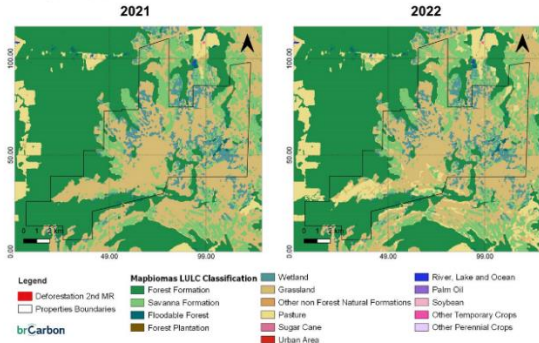
Year	$\Delta C_{LK-AS,planned}$	ΔC_{LK-ME}	$\Delta C_{LK-REDD}$
2022	36,190	99,415	135,604

3.2.2.8 Leakage Belt Forest Cover Benchmark Map

To demonstrate the "Leakage Belt Forest Cover Benchmark Map" parameter in the monitoring report for this monitoring period, the maps below show the location of forest land within the leakage belt area at the beginning and end of this monitoring period.

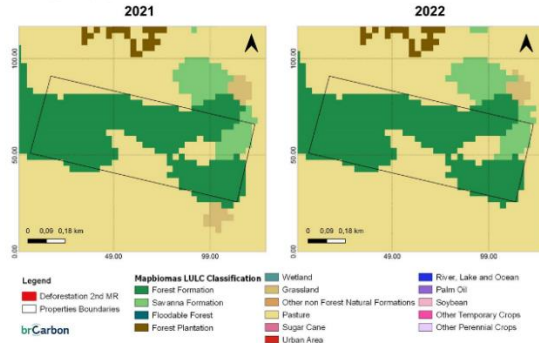
Benchmark Map Leakage AGROPECUÁRIA SANTA RITA

Referring to the project instance PAI 1 - 5



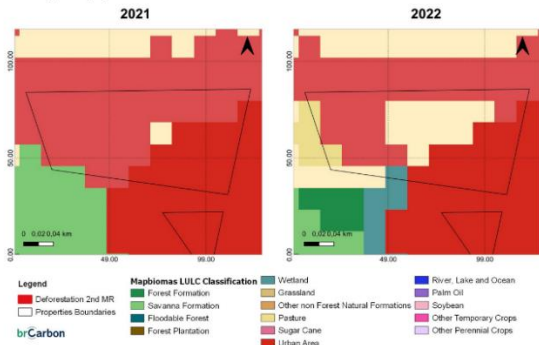
Benchmark Map Leakage CHÁCARA 01-R2

Referring to the project instance PAI 1 - 5



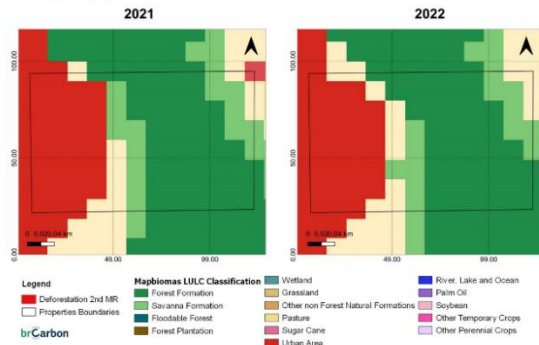
Benchmark Map Leakage CHÁCARA 02-B

Referring to the project instance PAI 1 - 5



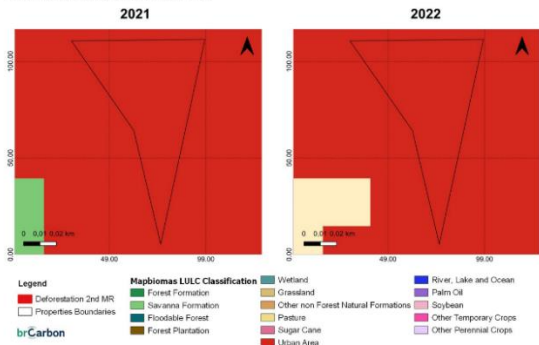
Benchmark Map Leakage CHÁCARA 02-R

Referring to the project instance PAI 1 - 5



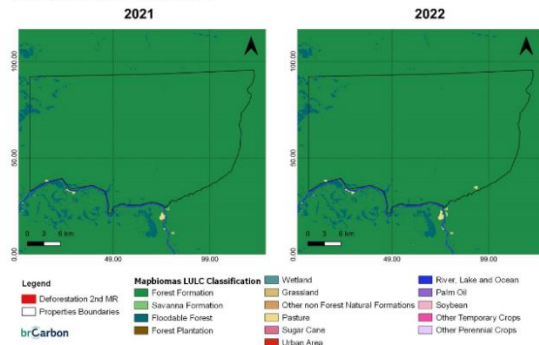
Benchmark Map Leakage CHÁCARA 05-A

Referring to the project instance PAI 1 - 5



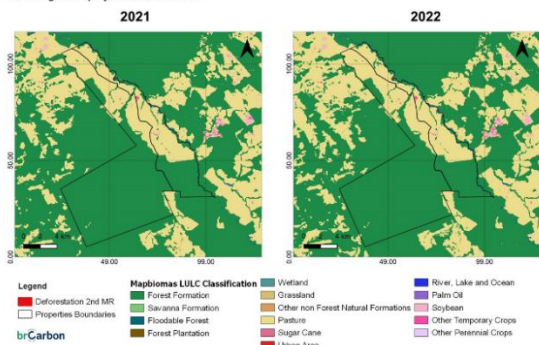
Benchmark Map Leakage FAZENDA CABAÇA

Referring to the project instance PAI 1 - 5



Benchmark Map Leakage Fazenda Cajueiro

Referring to the project instance PAI 15



Benchmark Map Leakage FAZENDA CHAPADÃO

Referring to the project instance PAI 1 - 5

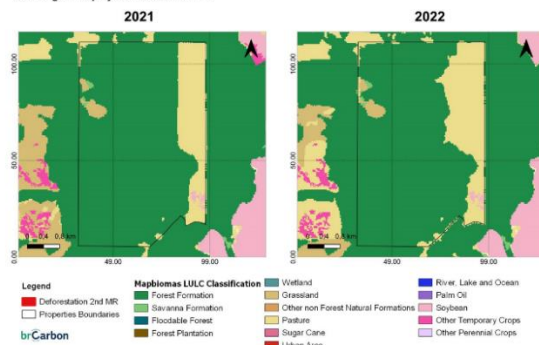
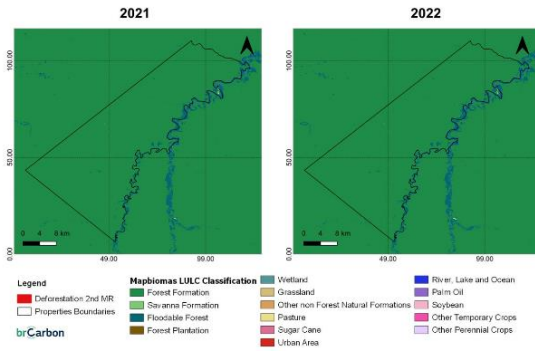


Figure 22. Leakage Belt Forest Cover Benchmark Map, Part I

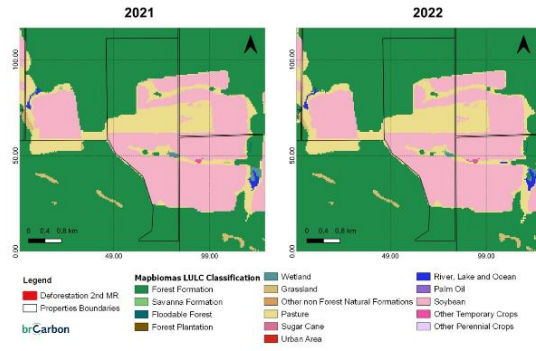
Benchmark Map Leakage FAZENDA JOÃO DE BARRO

Referring to the project instance PAI 1 - 5



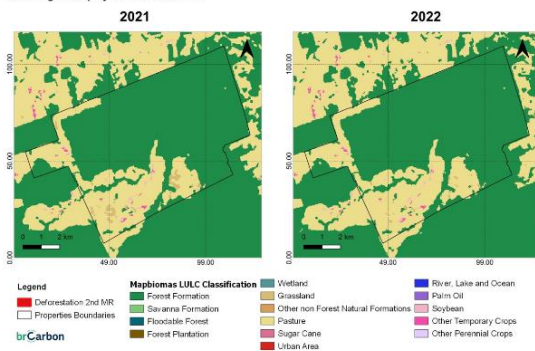
Benchmark Map Leakage LOTES 76 e 78

Referring to the project instance PAI 6



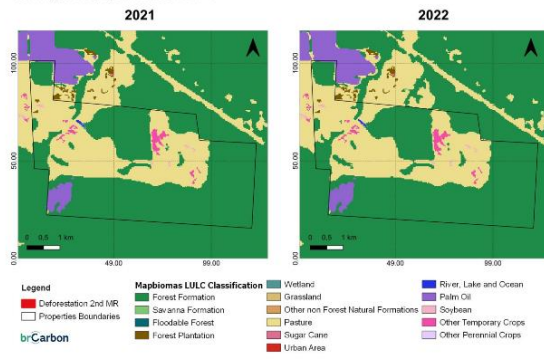
Benchmark Map Leakage Fazenda União

Referring to the project instance PAI 15



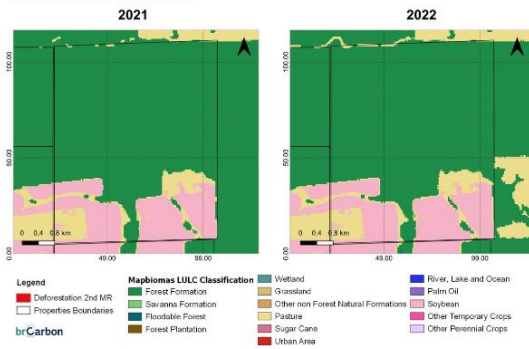
Benchmark Map Leakage Fazenda Varzea Alegre

Referring to the project instance PAI 7 - 8



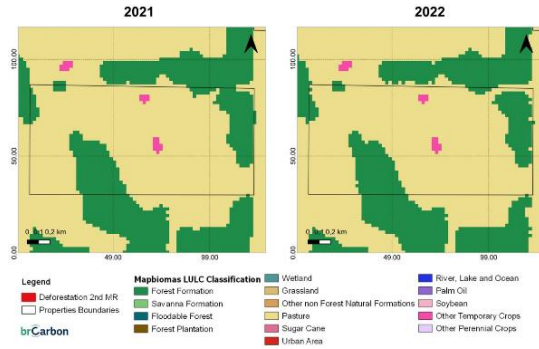
Benchmark Map Leakage LOTE 11

Referring to the project instance PAI 6



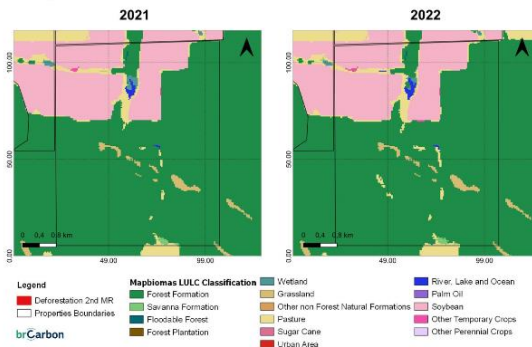
Benchmark Map Leakage LOTE 14

Referring to the project instance PAI 6



Benchmark Map Leakage LOTE 21

Referring to the project instance PAI 6



Benchmark Map Leakage LOTE 22-D

Referring to the project instance PAI 6

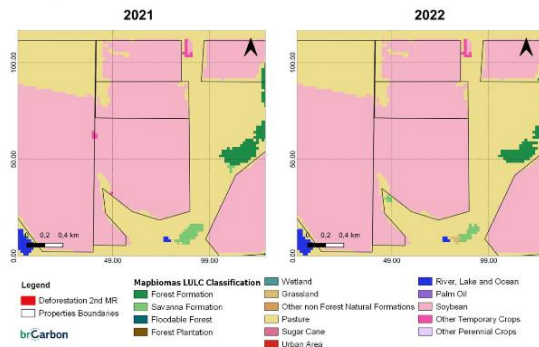
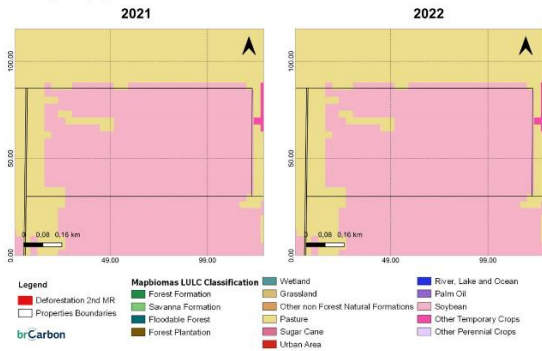


Figure 23. Leakage Belt Forest Cover Benchmark Map, Part II

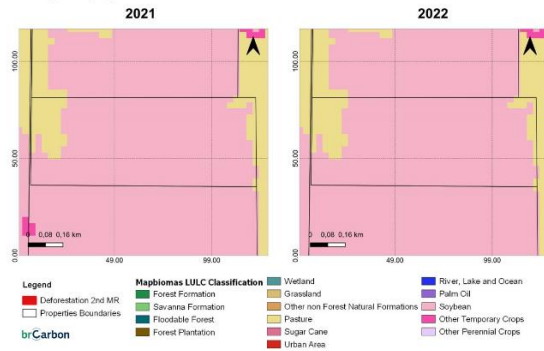
Benchmark Map Leakage LOTE 22-E

Referring to the project instance PAI 6



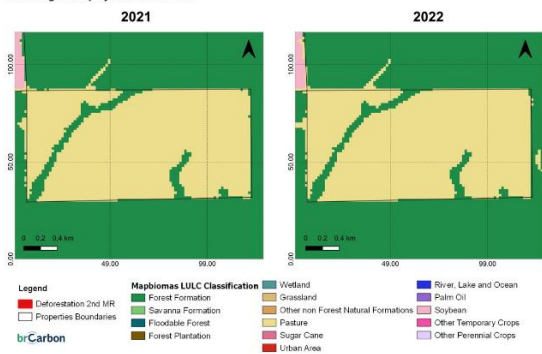
Benchmark Map Leakage LOTE 22-F

Referring to the project instance PAI 6



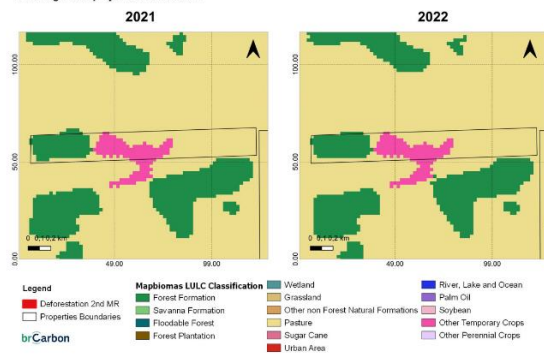
Benchmark Map Leakage LOTE 23-B

Referring to the project instance PAI 6



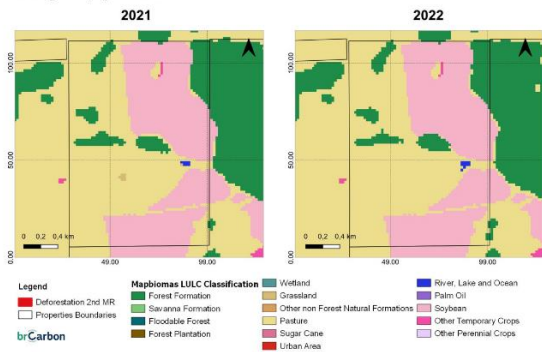
Benchmark Map Leakage LOTE 40

Referring to the project instance PAI 6



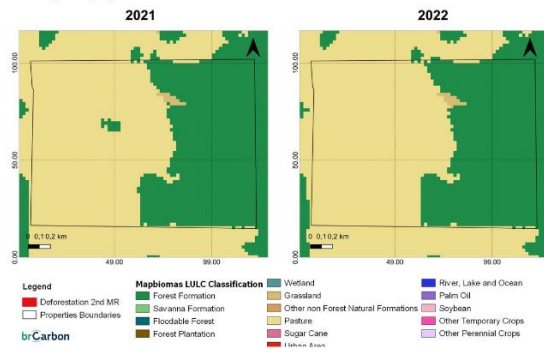
Benchmark Map Leakage LOTE 65

Referring to the project instance PAI 6



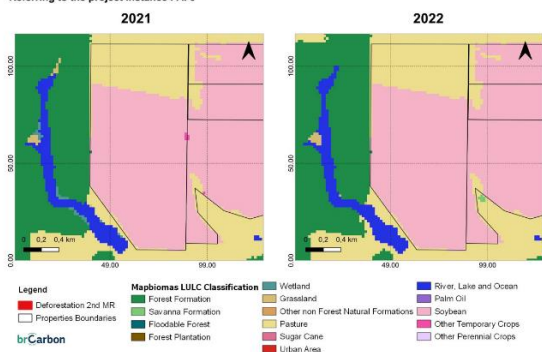
Benchmark Map Leakage LOTE 74-A

Referring to the project instance PAI 6



Benchmark Map Leakage LOTES 22B e 22C

Referring to the project instance PAI 6



Benchmark Map Leakage LOTES 23-A1

Referring to the project instance PAI 6

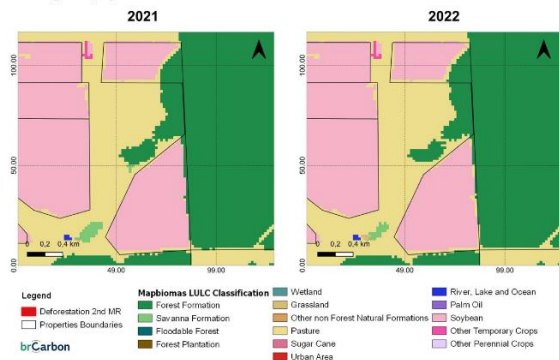
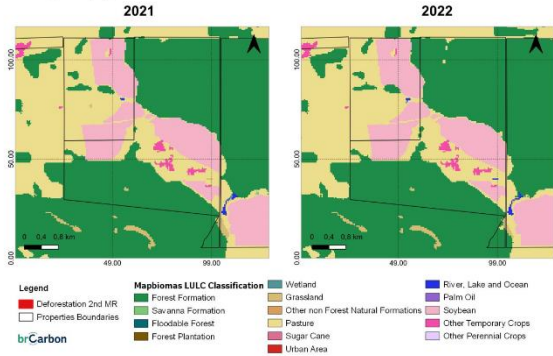


Figure 24. Leakage Belt Forest Cover Benchmark Map, Part III

Benchmark Map Leakage LOTES 66, 67, 68

Referring to the project instance PAI 6



Benchmark Map Leakage LOTES 73, 74, 75

Referring to the project instance PAI 6

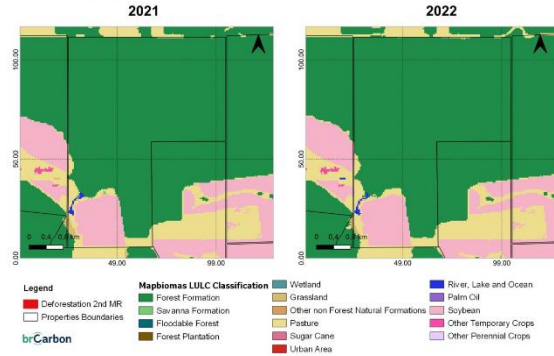


Figure 25. Leakage Belt Forest Cover Benchmark Map, Part IV

3.2.2.9 Activity Shifting Leakage

GHG leakage emissions due to activity shifting from forest lands that are legally authorized and documented to be converted to non-forest land were estimated following VMD0009 v1.3 criteria.

The total area of monitored deforestation ($A_{defLK,i,t}$) by the baseline agent of the planned deforestation in stratum i in year t (ha) was estimated through remote sensing. The new calculated forest clearance ($NewR_{i,t}$) by the baseline agent of the planned deforestation in the project scenario was conservatively configured as zero, in this way, all deforestation occurring outside the project boundaries was considered as project leakage. The area of activity shifting leakage ($LK_{Aplanned,i,t}$) is determined according to VMD0009 v1.3, equation 06. Data calculated for the second monitoring period are presented in the table below. GHG emissions due to leakage are defined according to VMD0009 v1.3, equation 01. Data calculated for the second monitoring period is presented in the table below. Net GHG emissions due to activity shifting leakage ($\Delta C_{LK-AS,planned}$) is 36,190 tCO₂e in the second monitoring period. The deforestation observed in the leakage areas was observed in the properties referring to PAIs #1-5 and can be seen in the figure below.

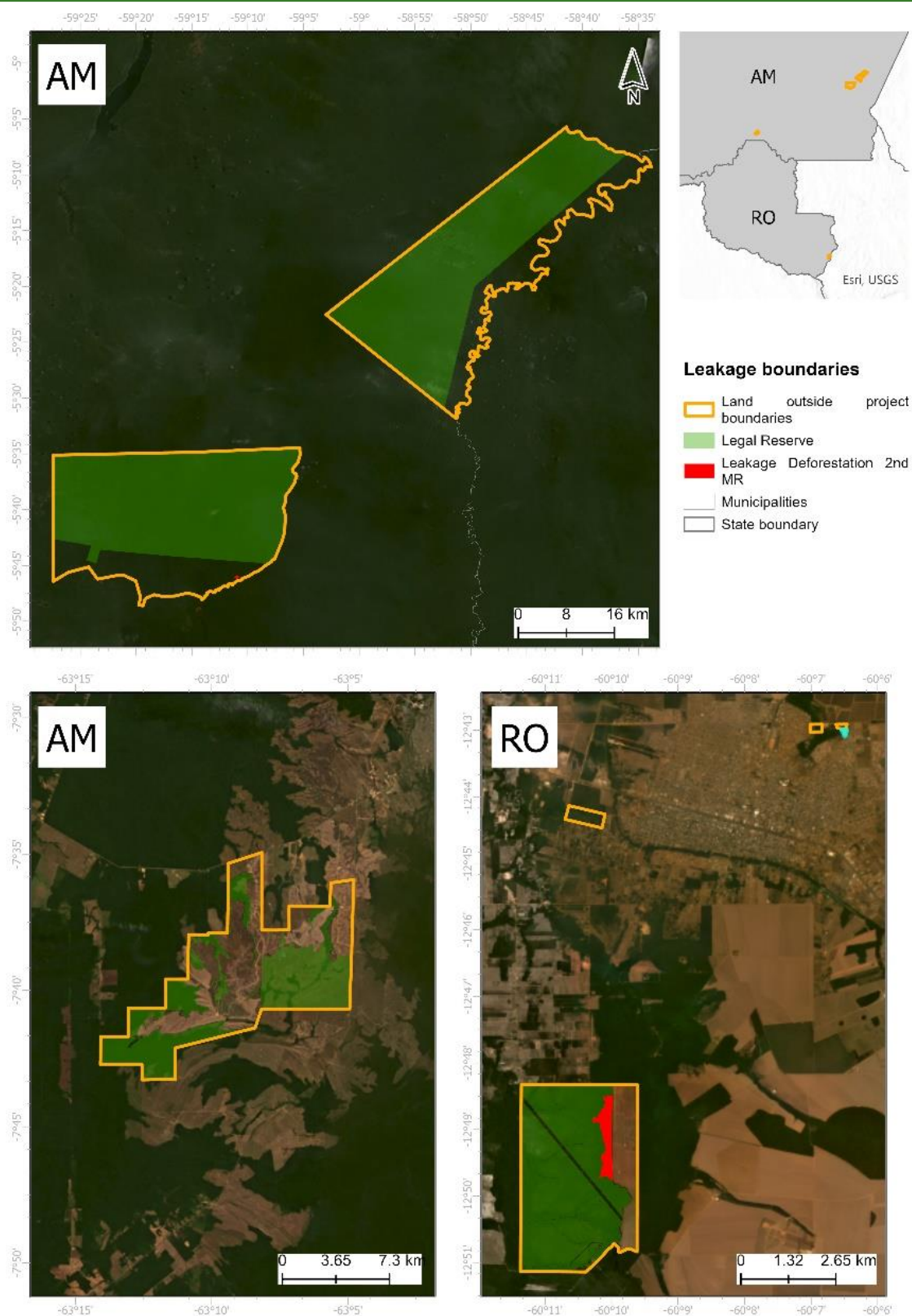


Figure 26. Properties subject to leakage monitoring.

Table 44. The area (AdefLK, I,t) and emissions (GHGLK,E,i, and Δ CLK-AS,planned) related to activity shifting leakage in the monitoring period in stratum i (ex-post).

Instance	Stratum	AdefLK,i,t	NewRi,t	LKApplanned,i,t (ha)	Δ CBSL,i	GHGLK,E,i	Δ CLK-AS,planned
PAIs #1-5	SN	63	-	63	231	1,205	15,743
	Da	3	-	3	599	1,626	3,423
	Ds	28	-	28	599	255	17,024
PAIs #6-9	-	-	-	-	-	-	-
Total		93	-	93	1,429	3,085	36,190

In the following table, it's possible to identify in the table 63 properties which are monitored as part of the leakage management plan, their geographical coordinates according to each instances.

Table 45. Properties subject to Leakage Monitoring.

PAI	ID	Properties	Area (ha)	City	State	Landowners/ Partnership	Coordinates	
							X	Y
#1-5	1	Faz. Cabaça	82,808.04	Borba	AM	Mr. Moacir Eloy Corecetta	-59.089	-5.578
#1-5	2	Faz. João de Barro	86,047.84	Borba	AM	Mr. Moacir Eloy Corecetta	-58.69	-5.097
#1-5	3	Chacara 01-R2	40.01	Vilhena	RO	Mr. Moacir Eloy Corecetta	-60.168	-12.738
#1-5	4	Chacara 02-B	3.37	Vilhena	RO	Mr. Moacir Eloy Corecetta	-60.11	-12.715
#1-5	5	Chacara 02-R	6.98	Vilhena	RO	Mr. Moacir Eloy Corecetta	-60.114	-12.717
#1-5	6	Chacara 05-A	0.43	Vilhena	RO	Mr. Moacir Eloy Corecetta	-60.108	-12.717
#1-5	7	Faz. Santa Rita	11,042.77	Humaitá	AM	Mr. Moacir Eloy Corecetta	-63.081	-7.646
#1-5	8	Faz. Chapadão	1,573.72	Vilhena	RO	Mr. Moacir Eloy Corecetta	-60.16	-12.805
#6	9	LOTES 23-A1	127.51	Pimenteiras do Oeste	RO	Incorporadora Manicoré LTDA	-61.464	-12.561
#6	10	LOTE 14	191.60	Parecis	RO	Incorporadora Manicoré LTDA	-61.581	-12.45
#6	11	LOTES 76 e 78	667.28	Alto Alegre dos Parecis	RO	Incorporadora Manicoré LTDA	-61.555	-12.564
#6	12	LOTES 22B e 22C	242.84	Pimenteiras do Oeste	RO	Incorporadora Manicoré LTDA	-61.484	-12.561

#6	13	LOTE 11	1,989.25	Alto Alegre dos Parecis	RO	Incorporadora Manicoré LTDA	-61.546	-12.495
#6	14	LOTE 40	49.48	Alto Alegre dos Parecis	RO	Incorporadora Manicoré LTDA	-61.633	-12.496
#6	15	LOTES 66, 67, 68	1,115.95	Alto Alegre dos Parecis	RO	Incorporadora Manicoré LTDA	-61.585	-12.541
#6	16	LOTE 22-E	43.79	Pimenteiras do Oeste	RO	Incorporadora Manicoré LTDA	-61.484	-12.539
#6	17	LOTES 73, 74, 75	1415.207	Alto Alegre dos Parecis	RO	Incorporadora Manicoré LTDA	-61.58	-12.518
#6	18	LOTE 22-F	42.73	Pimenteiras do Oeste	RO	Incorporadora Manicoré LTDA	-61.474	-12.543
#6	19	LOTE 74-A	306.02	Parecis	RO	Incorporadora Manicoré LTDA	-61.562	-12.446
#6	20	LOTE 65	406.53	Alto Alegre dos Parecis	RO	Incorporadora Manicoré LTDA	-61.614	-12.518
#6	21	LOTE 23-B	357.33	Pimenteiras do Oeste	RO	Incorporadora Manicoré LTDA	-61.464	-12.573
#6	22	LOTE 21	1,931.55	Pimenteiras do Oeste	RO	Incorporadora Manicoré LTDA	-61.546	-12.584
#6	23	LOTE 22-D	120.95	Pimenteiras do Oeste	RO	Incorporadora Manicoré LTDA	-61.484	-12.539
#7-9	25	Faz. União	6,915.76	Rondon do Pará	PA	Adão Ribeiro	-48.833	-4.241
#7-9	26	Faz. Cajueiro	18,926.28	Rondon do Pará	PA	Adão Ribeiro	-48.543	-4.156
#7-9	27	Faz. Várzea Alegre	2,178.22	Ipixuna do Pará	PA	Bruno Machado	-47.982	-2.756

Below, it's possible to identify in the map the areas that will be monitored as part of the leakage management plan of PAI #6.

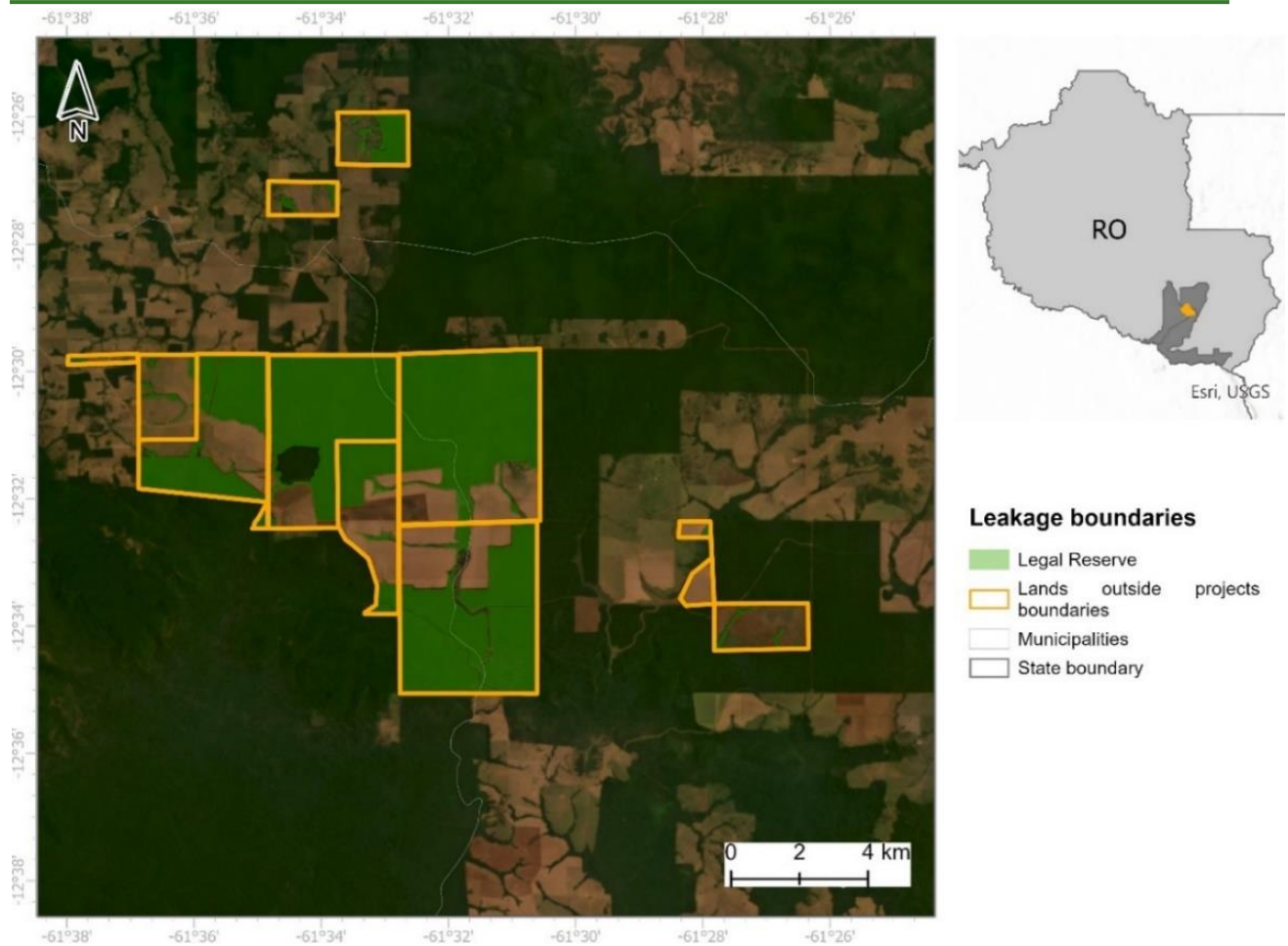


Figure 27. Properties subject to leakage monitoring.

Below, it's possible to identify the maps the areas that will be monitored as part of the leakage management plan of PAIs #7-9.

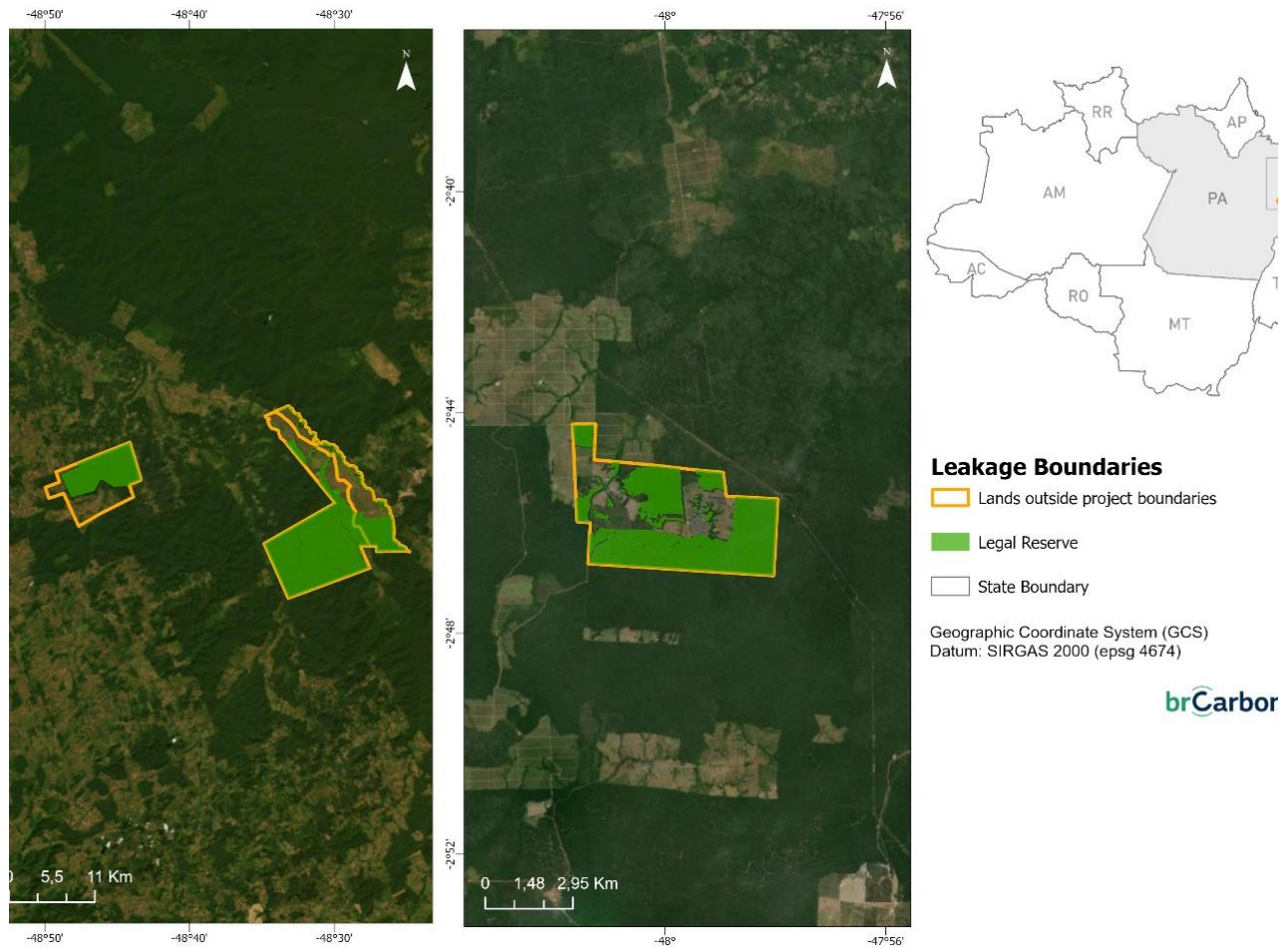


Figure 28. Properties subject to leakage monitoring.

3.2.2.10 Market Effects Leakage

Leakage factor for market effects calculations (LF_{ME}) is calculated according to VMD0011 v1.0 criteria (see section 4.3.2).

Carbon emission due to displaced timber harvests in the baseline scenario ($C_{BSL,XT,i,t}$) is calculated according to VMD0011 v1.0 equation 4. Summed emissions from timber harvest potentially displaced through implementation of carbon project $AL_{T,i}$ is estimated according to VMD0011 v1.0 equation 3. Market Effects Leakage Through Decreased Timber Harvest $LK_{MarketEffects,timber}$ is estimated according to VMD0011 v1.0 equation 2.

Carbon emission due to displaced fuelwood/charcoal harvests in the baseline scenario is calculated according to VMD0011 v1.0 equation 7. Summed emissions from fuelwood/charcoal harvests in the baseline case potentially displaced through project implementation ($AL_{FW/C,i}$) is calculated according to VMD0011 v1.0 equation 6. Market Effects Leakage Through Decreased Harvest of Fuelwood and Charcoal Sold into Regional and/or National Markets ($LK_{MarketEffects,FW/C}$) are calculated according to VMD0011 v1.0 equation 5.

Table 46. GHG emissions from market effects ΔC_{LK-ME} are calculated according to VMD0011 v1.0 equation 1 Data calculated for the second monitoring period are presented in the table below. Net greenhouse gas emissions due to market- effects leakage (t CO₂-e) (ex post). (Table 74 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Year	$V_{BSL,EX,i,t}$	$FG_{BSL,t}$	$LK_{MarketEffects,timber}$	$LK_{MarketEffects,FW/C}$	ΔC_{LK-ME}
2022	117,046	11,193	97,443	1,972	99,415

3.2.3 Net GHG Emission Reductions and Removals

3.2.3.1 Total Net GHG Emission Reduction

Table 47. Net GHG emission reduction estimates are based in VM0007 v1.6 equation 2 (see section 4.4.1). Data calculated for the second monitoring period are presented in the table below. Total net GHG emission reductions of the REDD project activity (t CO₂e) (ex-post). (Table 75 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
	$\Delta C_{BSL-REDD}$	$\Delta C_{WPS-REDD}$	$\Delta C_{LK-REDD}$	NER_{REDD}
2022	2,733,520	139,621	135,604	2,458,294
TOTAL	2,733,520	139,621	135,604	2,458,294

3.2.3.2 Calculation of AFOLU Pooled Buffer Account Contribution

Buffer is calculated through VM0007 v1.6 equation 13 (see section 4.4.2). Buffer withholding percentage is calculated according to AFOLU Non-Permanence Risk Tool v4.0 (Appendix XI - Risks). The overall non permanence risk rating is presented in the table below:

Table 48. Overall Risk Rating for the second monitoring period.

Risk Category		Rating
a)	Internal risk	0.00
b)	External risk	0.00
c)	Natural Risk	7.50
Overall risk rating (a + b + c)		10

3.2.3.3 Uncertainty Analysis

The uncertainty in baseline rate of deforestation is set as zero ($Uncertainty_{BSL,RATE} = 0$), as the deforestation rates are based on actual deforestation plans, following VMD0017 v2.2, sections 5.1.1 and 5.1.2 criteria. Uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline scenario is estimated according to VMD0017 v2.2 equation 5. The total error in the REDD+ project activity is therefore calculated by VMD0017 v2.2 equation 21¹⁴. The $U_{REDD-BSL,SS}$ parameter through equation 4 from VMD0017 v2.2 section 5.1.2 as described below:

$$U_{REDD-BSL,SS,i} = \frac{\sqrt{\sum_1^n \left(U_{REDD-BSL,SS,i,pool\#} \times E_{REDD-BSL,SS,i,pool\#} \right)^2}}{\sum_1^n E_{REDD-BSL,SS,i,pool\#}}$$

Where:

$U_{REDD-BSL,SS,i}$	Percentage uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline scenario in stratum i (%).
$U_{REDD-BSL,SS,i,pool\#}$	Percentage uncertainty for carbon stocks and greenhouse gas sources in the REDD baseline scenario in stratum i (%)
$E_{REDD-BSL,SS,i,pool\#}$	Carbon stock or GHG sources in the REDD baseline scenario (t CO ₂ e)

¹⁴ Here suitable not to show values related to WRC project activities, which were not included in the scope of this project.

i 1, 2, 3 ...M strata (unitless)

In this sense, carbon stocks and uncertainties from all relevant pools (CAB_tree,bsl,i; CBB_tree,bsl,i; CAB_non-tree, bsl,i; CBB_non-tree,bsl,i; CDW,bsl,i; CLI,bsl,i; CSOC,bsl,i) were taken into account (EREDD_BSL,SS,i,pool# and UREDD_BSL,SS,i,pool#, respectively). Thus, uncertainty across combined strata is assessed as follows (equation 5):

$$Uncertainty_{REDD-BSL,SS} = \frac{\sqrt{\sum_{i=1}^M (U_{REDD-BSL,SS,i} \times E_{REDD-BSL,SS,i})^2}}{\sum_{i=1}^M E_{REDD-BSL,SS,i}}$$

Where:

$Uncertainty_{REDD-BSL,SS}$ Total uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline scenario (%).

$U_{REDD-BSL,SS,i}$ Percentage uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline scenario (%)

$E_{REDD-BSL,SS,t,i}$ Carbon stock or GHG sources in the REDD baseline scenario (t CO₂e)

i 1, 2, 3 ...M strata (unitless)

The table below is the result of both applied equations early described per PAI and forest classes. The percentage uncertainty in the combined carbon stocks and greenhouse gas sources were calculated as the 95% confidence interval half width as a percentage of the mean (see Appendix IV - Carbon Pools Measures).

Table 49. Combined uncertainty of emissions and removals in project area in baseline scenario.

Instance	Uncertainty REDD-BSL,SS
PAI #1	4.14%
PAI #2	4.00%
PAI #3	4.00%
PAI #4	4.00%
PAI #5	4.00%
PAI #6	8.18%
PAI #7	3.79%
PAI #8	3.79%
PAI #9	3.79%
Total	0.7%

Total Uncertainty in REDD baseline scenario is estimated according to VMD0017 v2.2 equation 6 as follows.

$$Uncertainty_{REDD-BSL,t*} = \sqrt{Uncertainty_{BSL,RATE,t*}^2 + Uncertainty_{REDD-BSL,SS}^2}$$

Where:

$Uncertainty_{REDD-BSL,t*}$	Cumulative uncertainty in REDD baseline scenario up to year t* (%)
$Uncertainty_{REDD-BSL,RATE,t*}$	Cumulative uncertainty in the baseline rate of deforestation up to year t (%)
$Uncertainty_{REDD-BSL,SS}$	Total uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline scenario (%)
t	1, 2, 3, ...t* time elapsed since the start of the project activity (years)

Deductions are made in the case total error in the REDD+ project activity exceeds 15% of NER_{REDD} at the 95% confidence level according to VMD0017 v2.2 equation 21. No WRC activities have been included, therefore intrinsic expressions within the squared root of equation 21 were suppressed from its original structure (see equation below). As a result, data calculated for the second monitoring period are presented in further table.

$NER_{REDD+ERROR}$

$$= \sqrt{(Uncertainty_{REDDBSL,t*} \times \Delta C_{BSL-REDD,t*})^2 + (Uncertainty_{REDDWPS} \times \Delta C_{WPS-REDD,t*})^2} \times \left(\frac{1}{\Delta C_{BSL-REDD,t*} + \Delta C_{WPS-REDD,t*}} \right)$$

Where:

$NER_{REDD+ERROR}$	Cumulative uncertainty for the REDD+ (REDD and WRC) project activities up to year t* (%)
$Uncertainty_{REDDBSL,t*}$	Cumulative uncertainty in REDD baseline scenario up to year t (%)
$Uncertainty_{REDDWPS}$	Total uncertainty in the REDD project scenario (%)
$\Delta C_{BSL-REDD,t*}$	Net GHG emissions in the REDD baseline scenario up to year t* (t CO ₂ e)
$\Delta C_{WPS-REDD,t*}$	Net GHG emissions in the REDD project scenario up to year t* (t CO ₂ e)
t	1, 2, 3, ...t* time elapsed since the project start (year)

Table 50. Total net GHG emission reductions of the REDD+ project activities up to year t*adjusted to account for uncertainty (t CO₂e) (ex-post). (Table 77 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Year	NER_{REDD}	NER_{REDD+_ERROR}	Adjusted_ NER_{REDD+}
2022	2,458,294	171,112	2,458,294
Total	2,458,294	171,112	2,458,294

The Adjusted_NER_{REDD+} presented in the previous table is based on VMD0017 v2.2 equation 22. The equation terms which refer ARR and WRC activities were also removed from original structure (NGR_{ARR} and NER_{WRC}). The original equation is described as follow:

$$Adjusted_NER_{REDD+} = NGR_{ARR} + (NER_{REDD} + NER_{WRC}) \times (100\% - NER_{REDD+ERROR} + 15\%)$$

Where:

<i>Adjusted_NER_{REDD+}</i>	Total net GHG emission reductions of the REDD+ project activities up to year t* adjusted to account for uncertainty (t CO ₂ e)
<i>NGR_{ARR}</i>	Total net GHG removals of the ARR project activity up to year t* (t CO ₂ e)
<i>NER_{REDD}</i>	Total net GHG emission reductions of the REDD project activity up to year t* (t CO ₂ e)
<i>NER_{WRC}</i>	Total net GHG emission reductions of the WRC project activity up to year t* (tCO ₂ e)
<i>NER_{REDD+ERROR}</i>	Cumulative uncertainty for the REDD+ (REDD and WRC) project activities up to year t* (%)

3.2.3.4 Calculation of Verified Carbon Units

Total number of Verified Carbon Units (VCUs) generated by the project activity implementation is estimated (ex-ante) according to VM0007 v1.6 equation19 (see section 4.4.4 of the validated PD). The initial of the second monitoring period is from 20th October 2021 until 31st December 2022, due that the vintages were breakdown in two: 2021 (20th October 2021 until 31st December 2021) and 2022 (1st January 2022 until 31st December 2022), according with the VCS registration and Issuance process v4.2, section 4.1.2.

Data calculated for the second monitoring period is presented in the table below.

Table 51. Number of Verified Carbon Units (VCU) (ex-post). (Table 78 from Appendix II – Calculus tables – 01_INTEGRATED_CALCULUS_TABLE).

Year	Adjusted_NER _{REDD+}	Buffer _{Planned}	VCU _t
2022	2,458,294	259,390	2,198,904
Total	2,458,294	259,390	2,198,904

4 COMMUNITY

4.1 Net Positive Community Impacts

4.1.1 Community Impacts (CM2.1)

This section lists the impacts and direct benefits of project activities for each identified community group. The tables identify the groups and present the impacts and changes in well-being expected for them. BRC will elaborate on the assumptions for each action and the net positive well-being.

The actions in the area were primarily in the following areas: digital inclusion, health, education, land management improvement, water, and job training.

Regarding PAIs #1-5:

Table 52. Community impacts at PAIs #1-5

Community Group	Traditional communities of Palmares, Potiguar and Katianã.
Impact	Digital inclusion
Type of Benefit/Cost/Risk	Direct actual benefit: In 2022, 4 towers were installed in PAIs #2, 3 and 5 to expand internet access. In addition, solar panels and energy kits were also distributed.
Change in Well-being	With internet and energy access, the population has access not only to the digital inclusion, but also to citizenship rights.

Community Group	Traditional communities of Palmares, Potiguar and Katianã.
Impact	Well-being
Type of Benefit/Cost/Risk	Direct actual benefit: Donation of solar panels and energy kits to 18 families.
Change in Well-being	The well-being of families living in the rubber areas improves with the ability to store food and improve bathroom conditions.

Community Group	Traditional communities of Porongaba, Palmares, Potiguar and Katianã.
Impact	Health
Type of Benefit/Cost/Risk	Direct actual benefit: Through the partnership with the Department of Health of the Municipality of Sena Madureira, it was possible to hold the itinerant health event on September 8, 9 and 10, 2022. This activity was held in three different areas – Nova Olinda, Recife and Porongaba, but it just achieved the population of Porongaba center (far to the riverside) because of

	BRC's support and funding. During all the activities (on the three sites) of Itinerant Health Program a total of 1,665 treatments were carried out, such as: 409 doctor appointments, 68 dentist appointments, 132 people were vaccinated against Covid-19, 209 routine vaccinations, 142 flu shots, 11 nursing appointments, 287 rapid tests (IST's), 73 families had their registrations updated with government benefits and 360 pets were vaccinated against rabies (dogs and cats). However, it is not possible to measure properly the impact of BRC's intervention.
Change in Well-being	Financial and logistical support for actions aimed at the health of the communities has improved their health and well-being conditions.

Community Group	Traditional communities living on the upper Yaco River and neighboring Seringal Porongaba
Impact	Education
Type of Benefit/Cost/Risk	Direct actual benefit: One reformed school, with infrastructure improvements in bathrooms, canteen, plumbing and painting and with power kits (solar panel, inverter) and water pumps.
Change in Well-being	Improve infrastructure and education for the 90 students of Seringal Porongaba and other families living up in Yaco River and in the neighborhood for Seringal Porongaba.

Community Group	Traditional communities of Palmares, Potiguar, Porongaba and Katianã.
Impact	Sustainable Forest Management
Type of Benefit/Cost/Risk	Direct actual benefit: Mapping of potential non-timber forest products was initiated: Brazil nuts at Porongaba Farm (PAI #1 and PAI #4) and copaíba in Katianã and Potiguar. (PAI #2 and PAI #5). In addition, in November 2022 the landowner Batista & Cia obtained the FSC Forest Management seal for Conservation.
Change in Well-being	Improved land management through actions aimed at strengthening value chains and sustainable forest management.

Community Group	Traditional communities of Porongaba
Impact	Land regularization

Type of Benefit/Cost/Risk	Direct actual benefit: BRC takes care of the land regularization activities, which means the recognition of property rights
Change in Well-being	Hiring a service for georeferencing the lots and start the process of regularizing the community domain in Seringal Porongaba with 370 geodetic markers in the field, georeferencing of 40 land plots in Seringal Porongaba, with a total area of 2,367.68 ha.

Community Group	Traditional communities of Palmares, Potiguar, Porongaba and Katianã.
Impact	Cultural Benefits
Type of Benefit/Cost/Risk	Direct actual benefit: BRC supports cultural activities as traditional June Festival, donating of Bibles and other things to the houses of prayer
Change in Well-being	Celebrating social harmony through festival and prayer

Regarding PAI #6

The expected impacts of project activities can be found in this section. As previously mentioned, in PAI #6, the local community does not live in the project area, but in its surroundings.

After a socio-economic analysis based on participatory workshops, BRC works with community members to identify activities to be implemented during the project period according to the community needs ("wish list"). In order to improve the reality of the communities, BRC believes that it is essential to involve the members; therefore, the team is committed to engaging the community through social inclusion projects.

The following table describes possible project activities proposed in PAI #6 by the social diagnostic team:

Table 53. Community impacts at PAI #6

Community Group	Brazil nut extractivists at Matuará River
Impact	Strengthen local production chains and increase the economic resilience of communities.
Type of Benefit/Cost/Risk	Direct predicted benefit: Promote activities that add inclusive value chains and measures that strengthen the conservation of natural resources through trainings, capacities. and education workshops on sustainable management practices
Change in Well-being	The trainings will also improve the social organization through the formation of associations and organize the production and improve the local economy with the commercialization of

	products of the communities. through the formation of cooperatives.
--	---

Community Group	Curara Village and other residents of the Matuará River
Impact	Improved education.
Type of Benefit/Cost/Risk	Direct predicted benefit: Actions to support and improve the quality of education based on the improvement of work tools and educational methodologies. The possibility of attending secondary education is based on technological mediation and partnership with local and state actors.
Change in Well-being	Improvement of conditions and quality of teaching and actions to strengthen citizenship.

The expected impacts of the project activities can be found in this section. As previously mentioned, in the PAIs #7-9 group, local community do not live in the project area, but the surrounding area.

Following a socio-economic based on participatory workshops, BRC works with community members to determine activities to be implemented during the project period according to the community needs ("wish list"). BRC understands that in order to socially improve the reality in the communities, it is necessary to involve the members. Therefore, the team is committed to the inclusion of community through social integration projects.

The following table describes project activities that were agreed upon during the workshops and have begun to be implemented during the current monitoring period:

Table 54. Community impacts at PAIs #7-9.

Community Group	Brasil rural village
Impact(s)	Improve water access, fostering and support for solid waste management and recycling.
Type of Benefit/Cost/Risk	Direct actual benefit: around 175 people have improved access to water potability through the installation of water pumps, water tanks and hydraulic systems to supply homes and schools. Direct predicted benefit: Construction of one site. Indirect predicted benefit: improved health conditions
Change in Well-being	Will improve access conditions to water and water quality. indirectly impacting the community health

Community Group	PA Irmã Dorothy
Impact(s)	Educational access and a better school infrastructural condition at EF Comunidade Irmã Dorothy
Type of Benefit/Cost/Risk	Direct actual benefit: preparation of letter and awareness-raising advocacy actions with municipal education department. Indirect predicted benefit: improvement in the quality of teaching and education of local communities
Change in Well-being	Better conditions of educational development and increase access to settlement students

Community Group	Barreirinha Indigenous Lands.
Impact(s)	Community support benefits
Type of Benefit/Cost/Risk	Direct actual benefit: Guarantee the conditions of cultural and ordinary community meetings. Indirect predicted benefit: A better relation between BRC and the communitarians
Change in Well-being	Strengthen community ties

Community Group	Agua Settlements, Barreirinha Indigenous Lands and Diamantina II Settlements.
Impact(s)	Strengthen local production chains and increase the economic resilience of communities.
Type of Benefit/Cost/Risk	Direct actual benefit: Diagnosis, Improve training, capacities, and education workshops on sustainable practices such pasture management and wildfires prevent. Indirect predicted benefit: Promote activities that add inclusive value chains and measures that strengthen the conservation of natural resources.
Change in Well-being	Training will increase the communities' skills and create job opportunities for interested parties. The training will also improve the social organization through the formation of associations and organize the production and improve the local economy with the commercialization of products of the communities. through the formation of cooperatives.

4.1.2 Negative Community Impact Mitigation (CM2.2)

The precautionary principle serves not only to avoid a risk, but more importantly to legitimize and acknowledge the risks, which can be useful to clarify some issues in case decisions turn out to be wrong in the future.

BRC is aware that, as in any project that works with people, the implementation of activities can change the internal relationships between community members. Considering this, some negative impacts have been identified and are detailed below.

The first impact was caused by the Internet access in the schools of Porongaba. As expected, this action has not only positive impacts, but also negative ones. In this case, it was reported by local communities it caused agglomeration in schools' areas, loud music at night and consumption of drinks in the premises. This situation leads to a loss of educational quality and social harmony among community members. To alleviate the situation, the project proponent has posted signs throughout the area indicating that internet use is prohibited during class time. In addition, BRC has potentiated the internet sign to spread the concentration of people around the school building. Another measure foreseen in the project is the construction of a social center to be used for collective and cultural events.

Even if the actions to improve health have achieved satisfactory results, they have been timely and we understand that the low frequency of occurrence and limited access to health professionals are considered a weakness in this area, as cases of illness and accidents have been frequently reported to the local BRC team. Although this does not depend on and only corresponds to the project's impact and responsibilities. Over the years, the project will help improve the quality of health care by using strategies to improve the effectiveness of interventions to achieve this goal through partnerships and advocacy. As mentioned earlier, this is a political challenge and governments are responsible for ensuring this, as stated in the Brazilian Constitution. Aware about that we aim to improve health services in the region by deepening our relationship with the Secretary of Health of Sena Madureira and building an institutional relationship (PPP - Public-Private Partnership) through advocacy practices.

Finally, actions to regularize land, which include recognition of tenure rights, are a measure to resolve identified potential disputes over land disclosure. BRC recognizes that these actions are one of the most complex since the beginning of the project activities. As has already been communicated to the people of Porongaba, land grabbing by outsiders is a threat to the project, as it is a major driver of deforestation in the area, among other risks. In this sense, land regularization issues are a delicate challenge for the project. To mitigate these negative impacts on disputes, we have promoted a dialog with local communities and the landowner aimed at agreeing on measures to address deforestation based on land donations. Due to the bureaucratic challenges, this will take some time, which may cause frustration for people waiting for the paperwork. The BRC team is committed to explaining this process educationally and how it is structured to

guarantee not only the title of the land, but also the project's interest in avoiding deforestation. For more information, see Appendix VII - Communities.

In the same sense of the original instances are applied to the new ones, thus project activities were not designed to have a negative impact on other stakeholders' well-being. However, the project could increase the level of governance and dialog with government agencies responsible for providing basic services and improve the well-being of local community.

The identified HCVs were improved by the implementation of the project activities, as this better governance over river traffic, avoiding illegal or predatory activities. The areas that are fundamental for the livelihood of the communities are being improved through the additional conservation of forest cover promoted by the implementation of the project activities.

4.1.3 Net Positive Community Well-Being (CM2.3, GL1.4)

Regarding PAIs #1-5

In 2022, as part of the project implementation, BRCarbon has made several efforts and established partnerships with local stakeholders that have allowed to achieve several positive outcomes, not only for the climate, but also for the preservation of identified high conservation values important for communities and biodiversity. It must be emphasized that BRC believes in people (community members) as the most important partners to be successful in any initiative.

In this process, as there are many people, BRC prioritizes groups identified as vulnerable. Paying special attention to vulnerable groups is a requirement of the CCB standard and must be considered as a basic premise for action in the implementation of the grouped projects as a whole. Therefore, in addition to installing photovoltaic systems, water pumps, and freezers in the houses, the project proponent is meeting specific requirements where and how it can.

Considering the basic needs related to well-being as education and health, essential and structural actions were carried out, such as the donation of solar panel kits (inverters), water pumps for the families living in PAIs #2-5, which led to improved access to the area and provided better conditions for food storage.

In terms of improving **infrastructure and quality of life**, installing 5 internet towers and more than 70 km of fiber optic cables in 2021. In 2022, this reach was expanded with the installation of 4 more towers. This year the project has expanded Internet access in the instances of Acre (PAIs #2-5) reaching four more communities in Santa Luzia, Palmares, Potiguar and Katiana.



Figure 29. Implementation of activities to improve infrastructure and quality of life.

The logistics of getting this equipment there was not simple. It undergoes renovation of branches (rural roads), construction of bridges and use of canoes to transport equipment and parts.



Figure 30. Logistics for infrastructure implementation activities.

All these activities were financed by BRC and carried out with support of local labor.



Figure 31. Hiring people and local labor to the project implementation.

At **health** category, two major actions took place in the territory. In 2021, BRC team held Pink October at the Porongaba rubber plantation, in partnership with the Health Department of Sena Madureira. In all there were 259 attendances.

An important event, for the second consecutive year, was the implementation of the ambulatory health day, which consists of bringing the structure of a basic health unit to distant places to make quality health care accessible to all. Through partnership with the Health Secretariat, the BRC supported and funded part of this activity, which is a public policy at Acre state and Sena Madureira for a long time already. The support helped the public sector to reach a populations part who use to be out of itinerant health program, because of the community distance from the river bench and because the program access distant parts of the municipal territory just through the rivers, as the Iaco river.

In 2022 the action grew. Also, in partnership with the Sena Madureira City Hall, this time the activity was carried out in the Nova Olinda, Recife and Porongaba locations, according to Sena Madureira City Hall, 1665 assistances were provided, some of them were provided upon BRC financing, what means that the project has improved the spread of the public activity. The main services carried out in this action involved medical and dental care, quick tests, vaccination, registration update of the *Auxílio Brasil* (a national income transfer program) and preventive exams.

As already cited, on this occasion, it was even possible for the first time to bring the entire team of a health unit to the Manoel Rufino school, in the central region of Porongaba. This gave residents living in the center of the rubber plantations who had no access to services an opportunity to receive medical care. The action thus made a further contribution to Itinerant Health's goal, which is to provide quality health to all people.



Figure 32. Itinerant health action in 2022.

To improve **educational** conditions, the Iolanda Pacheco school was renovated and expanded in July 2022, in addition to the donation of printers, computers and televisions and internet access at the school. In the images it is possible to visualize the changes before and after at schools.



Figure 33. Expansion and renovation of schools in Porongaba.

To improve the population **well-being** in PAIs #2-5 a total of 18 solar kits were donated, 2 kits for schools, 5 for families who lived at Porongaba center, 2 for families lived in Seringal Katianã, 5 for families in Seringal Potiguar, 4 for families at Seringal Palmares, that were identified as vulnerable situation. The energy access has allowed the families to produce and store products to sell, providing a new income for the house.

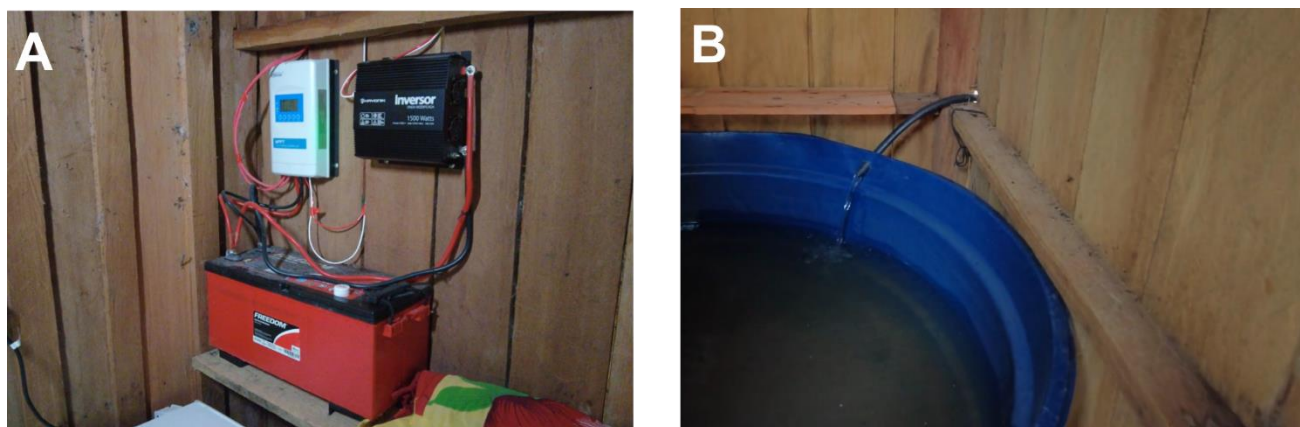


Figure 34. Example of some materials delivered: solar energy kits and hydraulic supply.

Finally, to encourage **sustainable forest management** activities, an initial mapping of the production potential of non-timber forest product, such as Brazil nuts and copaiba was carried out. This action is part of a

continuous process that aims to strengthen the value chains. Furthermore, forest conservation activities and the development of the carbon project on these rural properties led the owner to obtain the first record of forest management certification for conservation at FSC certification, in Latin America. For more information about these activities, please see the dates and reports at Appendix VII - Communities.

Regarding PAI #6

At PAI #6 traditional indigenous populations of the Mura Ethnicity group have been identified along the riverbanks, such as the Ponta Natal Community, which has demarcated lands (Pinatuba Indigenous Land), and the *Curara* community, which is in the process of demarcating its territory. It is expected that the conditions observed during the social baseline assessment (i.e., low levels of education, no access to health programs, lack of basic sanitation, marketing difficulties) will improve.

Considering the initial scenario, the Project Proponent BRC intends to implement actions to improve the well-being of traditional communities, as proposed in the Section 4.3, that are located in the vicinity of the Project Activity Instance #6, in addition to improving biodiversity conservation considering the global climate changes. The implementation of these actions will take into account the historical impacts of the lack of public policy and care for these traditional communities. A comparative assessment of before and after scenarios for nearby communities will be undertaken, and a qualification of the impacts on the well-being of these communities from the implementation of carbon projects in nearby areas.

About PAIs #7-9, before listing the net positive impacts on community well-being, it is important to highlight the **conditions without- project land use-scenario** for these new communities. The conditions observed during social baseline assessment (i.e., low levels of education, no access to health programs, lack of basic sanitation, lack of solid waste proper management, maintaining a livestock-based economy) are expected to improve.

In general, living conditions in the communities visited are very precarious. Those farther from the administrative centers of the municipality generally have roads that are difficult to navigate, further worsening access and possibilities for improvement.

The school that serves the community does not have access to potable water, electricity, Wi-Fi, bathroom, nor kitchen. There is no basic equipment to prepare teaching materials for the students. Moreover, there is no proper transportation to bring and pick up students to and from school. So, students have to walk, ride horses or ride motorcycles to get to school.



Figure 35. Place for school meals preparation at EMEF Urutum.

Considering PAIs #7-9, the net impact of the project on the well-being of all identified community groups has been positive. At this stage of project implementation, it is possible to describe some activities that have already started to be implemented which will lead to an improvement in the well-being conditions of the communities involved in the project.

Some activities have already been started, generating benefits from project to the communities, such as the improvement of water access conditions:

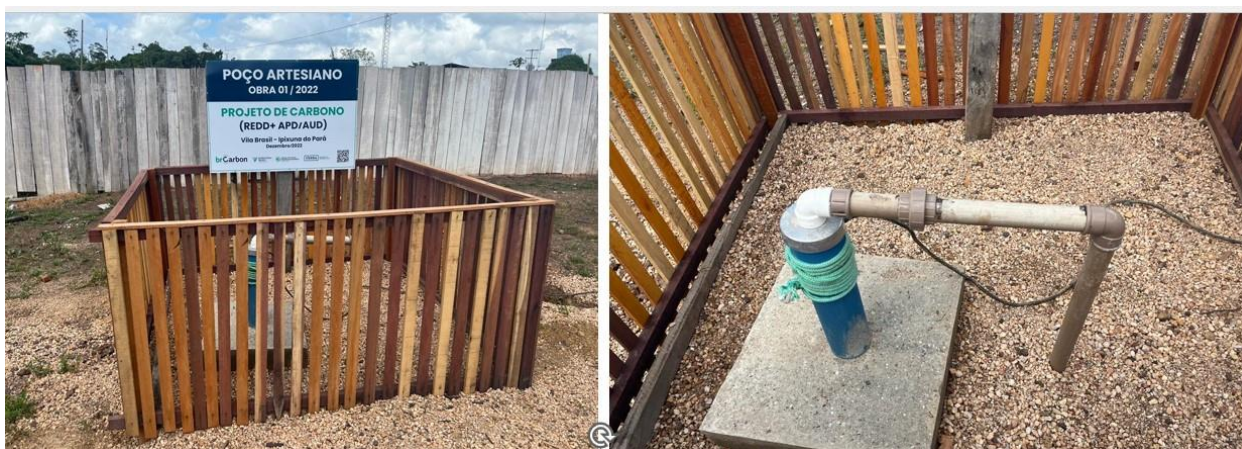


Figure 36. Project activity implementation and collection of water from an artesian well in Vila Brasil.

As mentioned, in addition, BRC also conducted workshops and trainings in sustainable livestock production in order to improve pasture management and agricultural production in the settlement near the project areas, as requested by the own community members. The following figure shows the recording of one of these workshops, which included women and was also attended by the owner of one of the farms in the project adjacent to the settlements.



Figure 37. Field Day – sustainable agricultural production practices at Bom Jesus Settlement.

Regarding education, BRCarbon has sent a letter to the Secretary of Education of the municipality of Rondon do Pará (see Appendix VII) aiming to stablish a cooperation agreement and align its actions and social benefits with the actions planned by the secretary. In this municipality, BRCarbon intends to first contribute to the improvement of infrastructures in the municipal schools of PA Irmã Dorothy. The architectural design for roof and lining renovation is also available in the project activities appendix.



Figure 38. Project for the construction and renovation of the Urutum Municipal School.

4.1.4 Protection of High Conservation Values (CM2.4)

In the first years of implementation, the Brazilian Amazon Project on PAIs #1-5 was focused on meeting the most critical health, education and well-being needs of the groups and communities identified in the project areas.

In addition to the forest conservation activities, the project also intends to expand its benefits in the renovation of the prayer house and the construction of a community center, two sites identified as social HCVs

for the livelihoods of communities. To ensure water quality, the project also intends to conduct new water quality samples, in addition to the water pumping activities that have improved access to this essential resource.

High Conservation Value	HCV 5 – a fundamental site to the people spiritual comfort – the cemetery and the prayer house.
Qualifying Attribute	The cemetery and the prayer house have a deep cultural significance to the local people, once are the spaces where they feel comfortable and respected.
Focal Area	The project area was defined as the focal area to be managed to maintain or improve this HCV, the project will invest in actions related to renovation of its spaces.

In Lagoa Grande area, according to the field assessment, interviews and participatory approach, local communities were encouraged to identify possible High Conservation Values (HCVs) through face-to-face door-to-door meetings. BRC understands that the concept of HCV is too abstract for communities and that participatory field mapping may be carried out on future occasions to adequately identify possible HCVs.

Having said that, considering PAI #6, BRC has identified just one potential HCVs in the project area that are related to community livelihood and traditional cultural identity, which is listed below:

High Conservation Value	HCV 5 - sites and resources fundamental to satisfy the necessities of local communities or indigenous people: the Matuará River.
Qualifying Attribute	The river not only provides water and food for the local community, but it is also culturally significant for identity and is fundamental for livelihood, being a source of fishing and food for families. It also serves as a space for leisure and well-being for the community. Furthermore, the river is a traditional path, historically it is like a road for the population.
Focal Area	The project area was defined as the focal area to be managed to maintain or improve this HCV, the project will invest in actions related to forest conservation and monitoring.



Figure 39. View of the Curará community for the Maturá River.

The Maturá River has winding stretches and the access to the base of the property is approximately 178 km of navigation from the Madeira River. It is a small river, largely with an area “*igapó*” on the banks and others, mainly where residents live with areas of “*terra-firme*,”. The *Igapó* areas have a period of flood and ebb corresponding to the region, where the period of ebb starts in April and continues until September, when it starts to fill up again. Most of local communities live from agriculture and wild crops harvesting. Some families have been living for more than five decades in the region.

BRC does not recognize and/or see any negative impacts of the project on the identified HCVs, rather, by forest protection measures, it sees its activities as a safeguard to protect the identified HCVs. BRC will be in constant contact with local people to modify the project process whenever necessary, not only to respect their customs and cultures, but also to reinforce their social engagement and trust in the project activities.

Considering PAIs #7-9, BRC has identified some potential HCVs in the project areas that are related to community livelihood and traditional cultural identity, which are listed below:

The Capim River was one of the resources mapped during the social engagement process as a place of high conservation value for indigenous people living in Barreirinha Indigenous land. The main channel, the Capim River, is approximately 764,82 km long, from its confluence with the Guamá River to its confluence with the basins of the Surubiju and Ararandua Rivers (De Lima, 2012).

High Conservation Value	HCV 5 - sites and resources fundamental to satisfy the necessities of local communities or indigenous people: the Capim River.
Qualifying Attribute	The river not only provides water and food for the indigenous community, it is also culturally significant for identity and is fundamental for livelihood, being a source of fishing and food for families. It also serves as a space for leisure and well-being for the community. Furthermore, the river is a traditional path, historically it is like a road for the population.
Focal Area	The project area was defined as the focal area to be managed to maintain or improve this HCV as it is the Barreirinha's indigenous land, the project will invest in actions related to forest conservation and monitoring.



Figure 40. Capim River on August 23rd of 2022

Another high conservation value was indicated for the spaces with cultural and traditional importance for the indigenous population. The *rameira/ramada*, for example, is a space in the form of a bandstand covered with straw that serves as a prayer space and other rituals.



Figure 41. Rameira/Ramada on Barreirinha indigenous land.

High Conservation Value	HCV 6 - cultural sites of local importance
Qualifying Attribute	Areas, features, with cultural significance archaeological, or historical, and/or of cultural, ecological, economic, or religious/sacred critique for the traditional cultures of local communities or indigenous peoples, identified through engagement with indigenous people.
Focal Area	The rameira/ramada is located behind the Nossa Senhora Aparecida school, in the Barreirinha indigenous land.

Barreirinha is an indigenous land and one of the communities encompassed by the project activities. The area is protected but the landscape context is surrounded by consolidated areas and productive lands. Apart from the fact that this area has a strategic location among the project areas, the positive impacts on the communities and surrounding biodiversity are of great importance to the project goals.

In addition to forest protection measures, BRC does not recognize and/or see any negative impacts of the project on the identified HCVs, on the contrary, it sees its activities as a safeguard to protect the identified HCVs. Anyway, BRC will be in constant contact with local people to modify the project process whenever necessary, not only to respect their customs and cultures, but also to reinforce their social engagement and trust in the project activities.

4.2 Other Stakeholder Impacts

4.2.1 Mitigation of Negative Impacts on Other Stakeholders (CM3.2)

The GPD social activities extended not only to families living in the project area, but also to families and communities in the surrounding project areas, at PAIs #1-5 it is evidenced by improvements in schools and support for itinerant health programs during the second monitoring period.

Project activities are not supposed to affect the welfare of other stakeholders in a negative manner. However, the project may increase the level of governance and dialog with government agencies responsible for monitoring, which may increase the frequency of legal sanctions, negatively affecting the land grabbers activities. If necessary, the project proponent and rural landowners will analyze and address any negative impacts that may occur during the implementation of project activities, and mitigation or adaptation measures will be implemented as applicable.

4.2.2 Net Impacts on Other Stakeholders (CM3.3)

The net impact of the project on the well-being of all identified stakeholders was positive. This can be evidenced by the fact that the implementation of the project activities goes beyond the project boundaries and are not limited to the identified traditional communities in the project area, but also include the surrounding communities.

About PAIs #6-9 the project social activities were also extended to families and communities in the surrounding area, as evidenced by improvements in schools, training in sustainable livestock production or support for mobile health programs during the first monitoring period.

As stated above, negative impacts on other stakeholders are generally not expected. If necessary, the project proponent and rural landowners will analyze and address any negative impacts that may occur during the project activities implementation, mitigation or adaptation measures will be adopted when applicable.

4.3 Community Impact Monitoring

4.3.1 Community Monitoring Plan (CM4.1, CM4.2, GL1.4, GL2.2, GL2.3, GL2.5)

In this section, the observed community variables, types of measurements, sampling methods are presented considering the original scope of GPD. The monitoring variables are directly related to the project goals for communities and community groups, as well as the predicted outcomes, outputs, and impacts identified in the project's causal model related to community well-being. Monitoring will assess differentiated impacts, including benefits, costs, and risks.

Although the minimum frequency for monitoring required by the certification standard is five years, the social monitoring indicators listed for the project in the Brazilian Amazon grouped project will be reported annually. BRC recognizes that some measures, especially those related to the social dimension, take time to present effective results of the process.

Therefore, monitoring is a continuous process of planning, recording, and evaluation. Each theme of the theory of change that the project proposes involves actions that go through the stages of diagnosis and development of proposals, from which the implementation of actions is guided and from these the result will be communicated, evaluated, and replicated if it is of interest, and applied corrective actions are taken when such actions have not been effective.

The figure shows the relationship between planning, registration, and the monitoring cycle. The table below shows the results during this period.

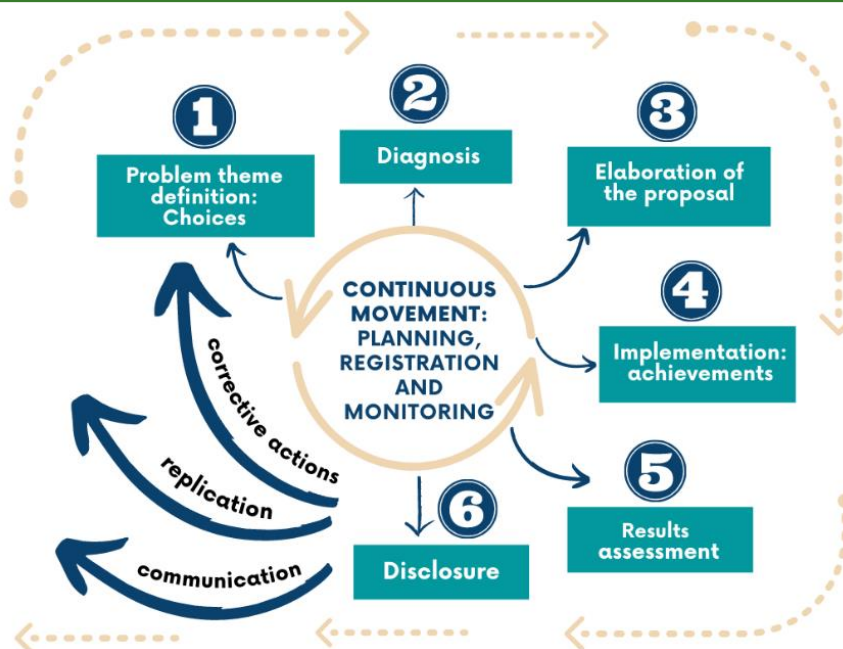


Figure 42. Monitoring cycle of participatory processes.

In this case, it is important to emphasize the difference between efficiency, efficacy and effectiveness. So, in this sense, efficiency is the ability to achieve the goals previously accorded in the right time, with the proper quality and the lowest cost, and efficacy is to use all the tools necessary and accessible to generate the best results, while effectiveness is what is really intended, which is a real improvement on communities' quality of life and on environment. As the project seeks through its actions to promote positive net impact on communities, therefore effectiveness, large monitoring periods are needed to evaluate if each of the actions summed with others, will achieve at the end, what the project desires and needs to reach its goals.

The following table provides the monitoring plan for the activities described in the project design, the variables monitored, and the sampling methods used, dates, frequency (when it is possible) of each one of them:

Table 55. Community Monitoring Plan in PAI #1

Activity description	Community variable	Sampling methods used, dates, frequency.	Results
Sustainable Forest Management	Number of firefighting equipment sets delivered.	The number of training and equipment records delivered were summarized at this monitoring event.	Done.
	Number of trainings in forest management, reduced impact logging and work safety, with a focus on FSC certification, carried out.		01 training
		Date: 31 December 2022 Frequency: annual	01 set of safety equipment's delivered.
	Number of safety equipment sets delivered.		01 certification of forest management (FSC) to conservation (November 2022)

Table 56. Community Monitorin Plan in PAIs #2-5

Activity description	Community variable	Sampling methods used, dates, frequency.	Results
Installing repeating towers + additional equipment to provide internet at PAI#2-5	Number of towers (60m high) installed.	The number of operational towers, solar panels, battery banks and the amount of optic fiber installed were counted with the service provider during the project monitoring. The internet was tested during the public meetings held in social engagement third and fourth stages.	Done.
			8 towers (60m high) installed.
	Number of tower (72m/ 82 m high) installed.	Date: 21 to 22 December 2022. Frequency: annual.	1 tower (72m high) installed.
			1 tower (82m high) installed.
	Number of solar panels deployed.		36 solar panels deployed.
	Number of Battery bank deployed.		36 Battery bank deployed.
	Total amount of optic fiber installed.		70Km of optic fiber installed.

Activity description	Community variable	Sampling methods used, dates, frequency.	Results
Sustainable Forest Management	Number of trainings in forest management, reduced impact logging and work safety, with a focus on FSC certification, carried out.	The number of training and equipment records delivered were summarized at this monitoring event.	Done.
	Number of safety equipment sets delivered.	Date: 31 December 2022 Frequency: annual	01 training # 01 certification of forest management (FSC) to conservation (Nov, 2022)
Biomass inventory	Number of trainings related with forest inventory.	The number of training records were summarized at this monitoring event.	Done.
		Date: 30 th July to 25 th August 2021 Frequency: annual	01 training, 08 people.
Capacity building / training related to Technical Assistance and Rural Extension (ATER): ecological pasture / voisin method; good practices for extracting chestnuts, good agricultural practices (subsistence agriculture), among others.	Number of capacitation related to ATER.	The number of training records were summarized at this monitoring event.	Done.
		Date: 05 th to 06 th and 16 th October 2021 Frequency: annual	02 trainings, 19 people.
Capacity building / training focused on encouraging collective work in the community, promoting the project to local associations.	Number of trainings related in the collaborative economy.	The number of training and equipment records delivered will be summarized at each monitoring event.	Under development
		Date: - Frequency: -	
Installation/renovation of an outpost to support traveling health campaigns promoted by the city hall in Sena Madureira.	Number of Outpost installed / renovated.	The number of outposts installed / renovated, and the total amount of money invested in this project activity will be counted at each monitoring event.	Under development
		Date: - Frequency: once	

Activity description	Community variable	Sampling methods used, dates, frequency.	Results
		OBS: BRC intends to build two experience centers in Porongaba, where these actions can be carried out and establish partnerships with the local city hall to improve the frequency of assistance.	
Articulation with the State Public Power to support the Itinerant Health Program for the region of the middle Iaco.	Number of health-related events / meetings / lectures in community.	The number of events records were summarized at this monitoring event.	Done, 2 events records. Through the partnership with the Department of Health of the Municipality of Sena Madureira, it was possible to hold the itinerant health event on September 8, 9 and 10, 2022. According to Sena Madureira City Hall a total of 1,665 treatments were carried out, such as: 409 doctor appointments, 68 dentist appointments, 132 people were vaccinated against Covid-19, 209 routine vaccinations, 142 flu shots, 11 nursing appointments, 287 rapid tests (IST's), 73 families had their registrations updated with government benefits and 360 pets were vaccinated against rabies (dogs and cats).
		Date: 09 th October 2021 to 31 st December 2022 Frequency: annual	
	Number of MOU or cooperation agreement signed.	The number of MOUs will be summarized at each monitoring event.	Operational, but not formalized yet
		Date: - Frequency: -	
Capacity building / training focused on workers safety in tree feeling.	Number of trainings executed.	The number of training records will be summarized at each monitoring event.	Planning phase
		Date: - Frequency: -	
Creation and implementation of a rescue plan.	Number of plans created and executed.	The number of plans will be summarized at each monitoring event.	Planning phase

Activity description	Community variable	Sampling methods used, dates, frequency.	Results
		Date: - Frequency: -	
Promotion of environmental sanitation through the implantation of ecological toilets / pits (eg: embrapa pit, pit with banana and tire, biodigester pit, dry toilet, etc.).	Number of courses to promote environmental sanitation.	The number of courses records will be summarized at each monitoring event.	OBS: BRC started a conversation with SDW ¹⁵ , a startup that develops environmental sanitation actions and promotes training on the subject, as well as workshops for building septic tanks and ecological toilets.
		Date: - Frequency: Not applicable yet	
	Number of new bathrooms.	The number of bathrooms will be counted at each monitoring event.	07 new bathrooms deployed at schools and BRC headquarter
		Date: October 2021 to December 2022 Frequency: triannual	
Promotion of improvements in water quality and access to water.	Number of waters potability analysis.	The number of waters potability analysis made was counted at this monitoring event.	Done.
		Date: 02 nd August 2021 Frequency: Annual.	09 samples were collected in different springs used by the communities and analyzed in laboratory
	Number of water filter distribution.	The number of water filters distributed was counted at this monitoring event.	Done.
		Date: 23 rd August 2021 Frequency: Annual.	10 filters distributed.
	Number of chlorine distribution.	The number of chlorine distribution events will be counted at each monitoring event.	Not done yet.
		Date: - Frequency: -	
	Number of water pumps installed.	The number of water pumps will be counted at each monitoring event.	18 water pumps and solar kits distributed
		Date: 30 th October 2021 to 31 st December 2021	
		Frequency: Not applicable	

¹⁵ <https://sdwforall.com/>

Activity description	Community variable	Sampling methods used, dates, frequency.	Results
Renovation / equipment of schools located in Seringal Porongaba.	Number of schools renovated.	The number of schools renovated will be counted at each monitoring event.	Two schools renovated
		Date: January 2022 to December 2022 Frequency: variable	
		OBS: repair levels vary depending on local infrastructure conditions.	
	Number of schools equipped with TV, Printer, and computer for better resources and distance learning.	The number of schools equipped was counted at this monitoring event.	Done.
		Date: 21 st to 22 nd October 2021 Frequency: Variable	02 TVs, 02 computers and 02 printers delivered in state schools Iolanda and Manuel Rufino.
	Number of schools equipped with library.	The number of schools renovated will be counted at each monitoring event.	
		Date: - Frequency: -	
Articulation with the State / Federal Public Power and private initiative to support education in the project area.	Number of payments for transportation of school supplies.	The number of payments and the total amount of money invested in this activity was summarized at this monitoring event.	Done
		Date: 21 st to 22 nd October 2021 Frequency: Annual.	01 supplies transportation paid by BRC (R\$200.00)
	Number of payments for students' transportation.	The number of payments and the total amount of money invested in this activity will be summarized at future monitoring events.	Not done
		Date: - Frequency: -	
	Number of articulations of local production of food for school meals.	The number of succeed articulations will be summarized at each monitoring event.	Not done yet
		Date: - Frequency: -	
	Number of facilitations of the association/cooperative's access to the national school feeding program (PNAE).	The number of facilitations will be summarized at each monitoring event.	Not done yet
		Date: - Frequency: -	

Activity description	Community variable	Sampling methods used, dates, frequency.	Results
	Number of articulations with funds and NGOs linked with educational cause for promoting distance learning.	The number of succeed articulations will be summarized at each monitoring event. Date: - Frequency: -	Not done yet
Lectures	Number of lectures on the environment, forests, environmental services, biodiversity, environmental conservation, sustainable forest management, climate change, carbon cycle, environmental legislation, labor legislation, associations, among others.	The number of lectures will be summarized at each monitoring event. Date: - Frequency: -	Under development
Fostering and support for solid waste management and recycling.	Number of lectures to promote solid waste separation and recycling (reduction, reuse, recycle).	The number of facilitations will be summarized at each monitoring event. Date: - Frequency: -	Not done yet
	Number of Construction of a suitable site for depositing and storing recyclable waste.	The number of constructions will be summarized at each monitoring event. Date: - Frequency: -	Not done yet
	Number of removals of recyclable waste.	The number of removals will be summarized at each monitoring event. Date: - Frequency: -	Not done yet
Hiring of community personnel	Number of people employed.	The number of people employed was counted and summarized at each monitoring event.	Done
		Date: 20 September 2021 to 31 December 2022 Frequency: Annual	04 person

Table 57. Community Monitoring Plan at PAI #6.

Activity description	Community variable	Sampling methods used, dates, frequency.	Results
Renovation / equipment of schools located in Curara village.	Number of meetings with educational state institutions (state and municipality)	The amount invested to the improvement on basic scholar infrastructure	Under development
	Number of schools renovated	Number of students registered in different levels of education (basic, elementary, and high school)	
	Number of schools equipped with TV, Printer, and computer for better resources and distance learning.	Date: - Frequency: -	
Articulation with the Special Indigenous Health District (DSEI) and the Special Secretary of Indigenous Health (SESAI)	Number of meetings with the institutions to implement a partnership	The number of health activities developed in the territory	Under development
		The total number of costs and investment made by the project to develop these activities	
	Number of health campaigns in the territory supported by the PP	Date: - Frequency: -	
Foster and organize new sustainable productive chains	Number of lectures, trainings, and courses about structure a productive chain (cassava flour and Brazilian nuts)	The number of activities developed to improve and refine the cassava flour production	Under development
	Number of productive materials donate to the community to implement the productive chain	The number of activities developed to improve and refine the Brazilian nuts production and extractivism	
		The number of equipment and basic structure financed and built to turn possible the development and structuration of the productive chains mapped	
	Number of meetings with external stakeholders to help the implementation and development of the productive chains	Date: - Frequency: -	

Articulation and support to the community demand on the state recognize area as an indigenous land	Number of local meetings to discuss and define the best community strategy to achieve the goal	The number of actions taken to transform the territorial status as demanded by the community decades ago	Under development
	Number of meetings with FUNAI (the governmental institution of indigenous issues)		
	Number of FUNAI visits to the community financed by the PP	Date: - Frequency: -	
Strengthen social organization	Number of lectures and courses of associativism and cooperativism	The number of communitarians involved in the discussions and supported to establish a community's social organization	Under development
	Number of interchanges between communities in different level of organization	Date: - Frequency: -	

Table 58. Community Monitoring Plan at PAIs #7-9.

Activity description	Community variable	Sampling methods used, dates, frequency.	Results
Renovation / equipment of schools located in Curara village.	Number of meetings with educational state institutions (state and municipality)	The amount invested to the improvement on basic scholar infrastructure	Under development
	Number of schools renovated	Number of students registered in different levels of education (basic, elementary, and high school)	
	Number of schools equipped with TV, Printer, and computer for better resources and distance learning.	Date: - Frequency: -	
Improvement on Health issues	Number of meetings with the health public system	The number of outposts installed / renovated, and the total amount of money invested in this project activity will be counted at each monitoring event.	Under development
	Number of Outpost installed / renovated.	The number of people involved in the trainings	
	Number of health trainings and courses	Date: Frequency:	

Activity description	Community variable	Sampling methods used, dates, frequency.	Results
Strengthen social organization	Number of lectures and courses of associativism and cooperativism	The number of communitarians involved in the discussions and supported to establish a community's social organization	Under development
	Number of local meetings to discuss and analyze the strategies to reinforce the local organizations	Date: Frequency:	
Support to women groups	Number of meetings with the women group	The number of women involved in the discussions and supported to establish and develop the group	Under development
		Date: Frequency:	
Formation and training in sustainable production – rural extension	Number of trainings in best practices on environmental issues	The number of beneficiaries involved in the activities	4 training courses held for sustainable management of pastures, involved 64 people
		Date: August/2022 Frequency: annual	
Improvement on water access	Number of artesian well built in the communities	The number of families with a better access to water	35 families with a better access to quality water
		Date: November/2022 Frequency: once	
Fostering good fire management and firefighting practices to communities to prevent the spread of wildfires in the project area.	Number of trainings executed.	The number of training and equipment records delivered were summarized at this monitoring event.	Under development
	Number of firefighting equipment sets delivered.		
	Number of safety equipment sets delivered.	Date: Frequency:	

It is worth noting that some activities foreseen at the time of validation for the first five instances (PAIs #1-5), have not yet been implemented, since they are constantly being renegotiated with the communities. In this

dynamic of joint construction of project activities and prioritization of what the communities understand as the most priority, some activities are being postponed, while new ones are being included in the planning. In this way, the monitoring plan for activities of a social nature is periodically adapted.

4.3.2 Monitoring Plan Dissemination (CM4.3)

The monitoring plan and monitoring results are available on Verra's website through the project description and monitoring reports full documents, moreover, specific actions were conducted in each PAI, taking into account the unique characteristics of each region.

For PAIs #1-5, the results of the second monitoring period were disseminated by the BRC team at public meetings held in March 2023. To better understand the results and different benefits and impacts of the project on climate, biodiversity, and local communities, BRC's social and communication team created a video to illustrate and disseminate the results of project's activities over the past few years. (The video can be accessed through the Link: <https://www.youtube.com/watch?v=sUreNYe05CM>). For PAI #6 and PAIs #7-9, the project's actions are currently being designed based on the initial diagnosis conducted by the social team. The activities implemented during the project lifetime and monitoring results will be discussed with local communities in public meetings aimed at this purpose, during the third and fourth social engagement stages.

5 BIODIVERSITY

5.1 Net Positive Biodiversity Impacts

5.1.1 Biodiversity Changes (B2.1)

The biodiversity monitoring included four faunistic groups (mammals, birds, reptiles, and amphibians) and considered endemic and threatened species. The table below summarizes the changes in biodiversity resulting from project activities under the with-project scenario during the monitoring period.

Table 59. Biodiversity changes

Change in Biodiversity	Mammals, Birds, Reptiles and Amphibians
Monitored Change	Positive indirect impact: maintenance of species richness and conservation of endemic and endangered species.
Justification of Change	Biodiversity positive impacts were achieved through the conservation of 5,218.74 hectares of forest that represents a useful area of habitat for hundreds of species. PAI #1: The forest conservation provides useful habitat for 356 species of which, 264 were birds, 28 mammals, 35 reptiles and 29 amphibians. Regarding the level of endemism, 96 species are endemic to the Amazon Forest (58 birds, 7 mammals, 15 reptiles

	and 16 amphibians). Thirteen species that are classified under some level of threat by the IUCN Red List. PAIs #2-5: The forest conservation provides habitat for 482 species of which, 336 were birds, 30 mammals, 37 reptiles and 79 amphibians. Regarding the level of endemism, 202 species are endemic to the Amazon Forest (113 birds, 16 mammals, 59 amphibians and 14 reptiles). Twelve species that are classified under some level of threat by the IUCN Red List PAI #6: The forest conservation provides useful habitat for 161 birds, 24 amphibians, 17 mammals and 17 reptiles, of which, 94 are endemic species and 11 are classified as threatened with extinction. PAIs #7-9: The forest conservation provides useful habitat for 138 species of birds, 9 reptiles, 18 amphibians and 13 mammals, of which, 55 are endemic and seven species are threatened with extinction.
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5.1.2 Mitigation Actions (B2.3)

Implementation of project activities had no negative impact on biodiversity. The threatened and endemic species identified (HCV) were preserved in the project area due to the conservation of forest cover and the maintenance of habitats promoted by the project activities implementation, which has reduced forest fragmentation, maintaining habitats availability.

5.1.3 Net Positive Biodiversity Impacts (B2.2, GL1.4)

Implementation of project activity avoided deforestation of native forest, which contributes to the maintenance of forest cover, habitat availability, and the species diversity in the project zone. The impact of the project on biodiversity was positive not only in the project area, but also in the project zone, compared to the deforestation for livestock activity, that would occur under the without-project land use scenario.

5.1.4 High Conservation Values Protected (B2.4)

Implementation of project activities has resulted in direct conservation of forest cover on private areas in the project zone, contributing to habitat conservation, species diversity maintenance, protection of threatened and endemic species and landscape integrity. Therefore, no HCV related to biodiversity in the project zone has been negatively affected, on the contrary, the project activity is promoting its conservation.

5.1.5 Invasive Species (B2.5)

No invasive species (plants or animals) have been introduced as a result of project activities, nor have populations of invasive species increased as a result of project activities during the monitoring period. The main economic activity of the region is livestock, and for this reason a "non-native" grass species (*Brachiaria sp.*) was introduced by local families during the pasture formation. Although *Brachiaria* can be considered an aggressive species, it cannot establish in shaded environments such as tropical forests and is therefore not considered invasive in the project areas.

5.1.6 Impacts of Non-native Species (B2.6)

Table 60. Non-native species impacts.

Species	<i>Brachiaria sp</i>
Justification of Use	Brachiaria was introduced for livestock in the 1960s and shows advantages over other species due to its characteristics to persist in soils with acidification and/or low fertility.
Adverse Effect	Although Brachiaria can be considered an aggressive species, it cannot establish in shaded environments such as tropical forests and is therefore not considered invasive. No disease has been introduced or favored by the use of Brachiaria.

5.1.7 GMO Exclusion (B2.7)

No genetically modified organism (GMO) was used in the project activities during the monitoring period.

5.1.8 Inputs Justification (B2.8)

Project activities do not foresee the usage of inputs, such as fertilizers, chemicals, or pesticides in the project area, since it is based in conservation activities that seek to avoid deforestation and forest degradation.

5.2 Offsite Biodiversity Impacts

5.2.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Actions (B3.2)

Considering it's a conservation project, no potential negative impacts on biodiversity outside the project zone are expected as a result of the project activities implementation, on the contrary the biodiversity outside the project zone is expected to be benefit by the project implementation.

5.2.2 Net Offsite Biodiversity Benefits (B3.3)

No negative impacts on biodiversity outside the project zone are expected. Considering it's a conservation project, the net effect of the project on biodiversity inside and outside the project areas is deemed always positive.

5.3 Biodiversity Impact Monitoring

5.3.1 Biodiversity Monitoring Plan (B4.1, B4.2, GL1.4, GL3.4)

This section presents the biodiversity variables monitored, sampling methods, dates, frequency, locations, and results, for all PAI.

As described in the PD, biodiversity monitoring plan includes the monitoring of four biodiversity groups (mammals, birds, reptiles, and amphibians) considering four biodiversity variables (species richness, number of threatened species, endemic species, and game species). Monitoring variables are directly linked to the project's biodiversity conservation objectives and to the predicted outcomes, outputs and impacts identified in the project's causal model related to biodiversity conservation.

- **Monitoring frequency**

The minimum monitoring frequency is five years. However, since the project start,, the project proponent has performed nine biodiversity monitoring campaigns in different seasons (wet and dry). In the present monitoring period, five fauna monitoring campaigns were conducted. The complete dates, frequency, and respective monitoring period for each PAI are described in the table below.

In each campaign, BRC team increase the sampling effort and thus the information content in terms of the biodiversity variables monitored. Therefore, it is important to present the collected information from all biodiversity campaigns, showing the cumulative number of species richness, number of threatened species, endemic species, and game species found in the project area.. The results of the present monitoring period as well as the cumulative results are described below.

Table 61. Fauna monitoring campaigns conducted within the project areas. Dates are written as day/month/year.

Monitoring period	State	PAI	Campaign Date	Season
Initial Diagnosis	MT	PAI #1	30/04/2021 to 05/05/2021	Rainy
	AC	PAIs #2-5	05/04/2021 to 18/04/2021	Rainy
1 st Monitoring Period (02/08/2021 to 19/10/2021)	MT	PAI #1	08/10/2021 to 16/10/2021	Dry
	AC	PAIs #2-5	09/10/2021 to 22/10/2021	Dry
2 nd Monitoring Period (20/10/2021 to 31/12/2022)	AC	PAIs #2-5	26/03/2022 to 02/04/2022	Rainy
	PA	PAIs #7-9	27/06/2022 to 11/07/2022	Dry
	AC	PAIs #2-5	07/08/2022 to 22/08/2022	Dry
	MT	PAI #1	10/09/2022 to 25/09/2022	Dry
	AM	PAI #6	18/11/2022 to 01/12/2022	Rainy

- **Sampling methods**

Specific sampling methods were applied to monitor each biodiversity group following the methodology described in the monitoring plan of the registered PD. Mammals monitoring was conducted using active search and camera traps survey methods, two approaches traditionally used in medium and large mammals' surveys (Cullen Jr. et al., 2003). The active search method consisted of free surveys carried out by specialists searching for animals (e.g., sighting or vocalizations) or their signs (e.g., footprints, tracks, feces, bones, etc.) walking at a constant velocity rate along pre-existing irregular trails. Searches were conducted in two time periods, the first beginning at sunrise and lasting until 1:00 pm, and the beginning after the hottest hours, around 3:00 pm, and lasting into the night period. All records were listed in a field spreadsheet and verified by photographic records whenever possible.

Camera traps were installed on fauna trail/paths, attached to tree trunks approximately, 45 cm above from the ground. The camera remained in operation for 24 hours and attractive baits were used to enhance the recordings. The exact location of the cameras trap installation was recorded using GPS and is available in Appendix III - Biodiversity.



Figure 43. Camera trap installation on the field.

The method of active search on trails (irregular transects) was used for bird monitoring. The method consists of walking at a constant speed along existing trails, firebreaks, and roads to determine the presence of identified species. The objective of this method is to provide the most complete and reliable list of avifauna for the site surveyed. Walking routes were conducted within the project areas, as well as small boat routes that covered streams and adjacent environments. All visual and/or acoustic records that resulted in an unequivocal identification of the species were included. Visual identification was made using binoculars (Bushnell 10x42) and recording equipment (Sony PX240 and Roland R05) and identification books when necessary. Sampling

was carried out in two time periods, the first beginning at sunrise and lasting until 1:00 p.m. and the second beginning after the hottest hours of the afternoon, around 3:00 p.m., and lasting into the night period.

Surveys of species diversity reptiles and amphibians present in the areas of interest were carried out using the active visual search method. Data collection occurred twice daily during the morning period (5:00 am - 12:00 p.m.) and twilight/night (4:00 p.m. - 10:00 p.m.) to cover the period of greatest amphibian and reptile activity. This method consists of a visual search of environments conducive amphibian and reptile presence during the day and night in search of specimens, thoroughly checking all available microhabitats such as litter, fallen logs and rocks, among aerial roots, holes in the ground and trees, aquatic environments, termite mounds and others (Heyer et al., 1990). Active searching involved searching as the team moved from one area to another. When necessary, the vocalizations of anuran amphibians were recorded using a Sony Icd-px 240 digital recorders. Searches were conducted both inside and outside forest fragments, to cover sample the largest area and diversity of environments favorable to the occurrence of amphibians and reptiles.

- **Results PAI #1**

In each campaign, the sampling effort is increased, and new species are found. For that reason, it is important to present the collected information from all biodiversity campaigns, showing the cumulative results from all the monitoring campaigns.

The results of the three biodiversity monitoring campaigns carried out in PAI #1 found a total of 264 bird species, 28 mammal species, 29 amphibian species and 35 reptile species. Regarding the level of endemism, 96 species are endemic to the Amazon Forest (58 birds, 7 mammals, 15 reptiles and 16 amphibians). The table below summarizes the results. The full results of the fauna inventory, the description of field methodology, species lists, and photographic can be found in Appendix III - Biodiversity. Some of the photographic records of the fauna in the project area are shown below.

Table 62. Cumulative results from three biodiversity monitoring campaigns carried out in PAI #1.

	Mammals	Birds	Reptiles	Amphibians	Total
Total richness	28	264	35	29	356
Endemic species	7	58	15	16	96
Endangered species*	7	5	1	0	13

*Classified as Near Threatened, Vulnerable, Endangered or Critically Endangered according to IUCN Red List.

Thirteen species classified as threatened by the IUCN Red List were found during fauna monitoring in PAI #1. Among the reptiles, only one species, the tortoise *Chelonoidis denticulatus* (jabuti-amarelo), is classified as Vulnerable. In the bird group, five species are classified as Vulnerable: *Psophia viridis* (jacamim-de-costas-verdes), *Tinamus tao* (azulona), *Pipile cunjubi* (cunjubi), *Hypocnemis ochrogyna* (cantador-ocráceo), and *Dendrocolaptes hoffmannsi* (arapaçu-marrom).

In the Mammalia group, the feline *Panthera onca* (onça-pintada) is classified as Near Threatened (NT). Six species are classified as Vulnerable: *Tayassu pecari* (queixada), *Priodontes maximus* (tatu-canastra), *Tapirus terrestris* (anta), *Alouatta puruensis* (guariba), *Lagothrix lagothricha* (macaco-barrigudo), and *Chiropotes albinasus* (cuxiú-de-nariz-branco). The monkey *Ateles chamek* (macaco-aranha-de-cara-preta) is classified as an Endangered.

- **Results PAIs #2-5**

As described earlier, three fauna monitoring campaigns were conducted in PAIs #2-5. The results from these campaigns indicate that a total of 336 bird species, 30 mammal species, 79 amphibian species and 37 reptile species occur in PAIs #2-5 project area. Regarding endemism, 202 species are endemic to the Amazon Forest, including 113 birds, 16 mammals, 59 amphibians and 14 reptiles.

The table below summarizes the results found during monitoring. The full results of the fauna inventory, including a description of field methodology, species lists, and photographic records are available in Appendix III - Biodiversity. Some of the photographic records of fauna in the project area are shown below.

Table 63. Cumulative results from three biodiversity monitoring campaigns for PAIs #2-5.

	Mammals	Birds	Reptiles	Amphibians	Total
Total richness	30	336	37	79	482
Endemic species	16	113	14	59	202
Endangered species*	6	4	2	0	12

*Classified as Near Threatened, Vulnerable, Endangered or Critically Endangered according to IUCN Red List.

During the monitoring, BRC found twelve species that are classified as threatened by the IUCN Red List. In the bird group, four species classified as Vulnerable of extinction were found: *Cnipodectes superrufus*, *Pionites leucogaster*, *Primolius couloui* and *Tinamus tao*.

In the herpetofauna group only two species is classified as Vulnerable (VU) in the IUCN Red List: the tortoise *Podocnemis unifilis*. The main threat to its population is hunting for consumption in local cuisine. It is a slow species, easily captured and vulnerable during its reproductive season, when its eggs are also often collected for culinary purposes (Schneider et al., 2012; Cunha et al., 2020).

In the mammal group, five species are classified as threatened by the IUCN Red List, four Vulnerable (*Tayassu pecari*, *Tapirus terrestris*, *Alouatta puruensis* and *Cebus unicolor*) and one Endangered (*Ateles chamek*).

The table below summarizes the results found during monitoring. The full results of the fauna inventory, a description of field methodology, species lists, and photographic records are available in Appendix III - Biodiversity. Some of the photographic records of fauna in the project area are shown below.

- **Results PAI #6**

A total of 219 species were found during biodiversity monitoring activities in PAI #6. The following table summarizes the results. The complete fauna inventory results, including a description of the field methodology, species lists, and photographic records can be found in Appendix III (Biodiversity). Some photographic records of the fauna in the project area are shown below.

Table 64. Biodiversity monitoring results found in the project area PAI #6.

	Mammals	Birds	Reptiles	Amphibians	Total
Total richness	17	161	17	24	219
Endemic species	7	65	6	16	94
Endangered species*	8	3	0	0	11

*Classified as Near Threatened, Vulnerable, Endangered or Critically Endangered according to IUCN Red List

It is important to highlight that eleven species found during the fauna inventory are classified as threatened with extinction under the IUCN Red List. This means these species are at risk of extinction in the wild, and habitat conservation measures are essential to ensure their survival. In the group of mammals, five species are classified as Vulnerable: *Tapirus terrestris* (anta), *Priodontes maximus* (tatu-canastra), *Myrmecophaga tridactyla* (tamanduá-bandeira), *Mico marcai* (sagui-de-marca), and *Chiropotes albinasus* (cuxiú-de-nariz-vermelho). Three mammals are classified as Endangered by the IUCN: *Inia geoffrensis* (boto-vermelho), *Ateles chamek* (macaco-aranha-de-cara-preta), and *Pteronura brasiliensis* (ariranha).

Among birds, three species are classified as Vulnerable: *Dendrocolaptes hoffmannsi* (arapaçu-marrom), *Tinamus tao* (azulona), and *Psophia viridis* (jacamim-de-costas-verdes).

- **Results PAIs #7-9**

A total of 178 species were found during biodiversity monitoring activities in PAIs #7-9. The table below summarizes the results. The complete results of the fauna inventory, including the description of the field methodology, species lists, and photographic records, can be found in Appendix III - Biodiversity. Some of the photographic records of the fauna in the project area are shown below.

Table 65. Biodiversity monitoring results found in the project area of PAIs #7-9.

	Mammals	Birds	Reptiles	Amphibians	Total
Total richness	13	138	9	18	178

Endemic species	2	41	2	10	55
Endangered species*	3	3	1	-	7

*Classified as Near Threatened, Vulnerable, Endangered or Critically Endangered according to IUCN Red List

It should be emphasized that seven species found during the fauna inventory are classified as threatened with some level of extinction on the IUCN Red List. This means these species are at risk of extinction in the wild, and actions to promote habitat conservation are essential to guarantee their survival. The bird species *Psophia obscura* is classified as Critically Endangered due to habitat loss and hunting pressure. Other birds, such as *Guaruba guarouba* and *Lepidothrix iris*, are classified as Vulnerable. Additionally, three mammal species (*Alouatta belzebul*, *Tapirus terrestris*, and *Tayassu pecari*) and one reptile (*Chelonoidis denticulatus*), all classified as Vulnerable, were also found in the project areas of PAIs #7-9 during monitoring activities.

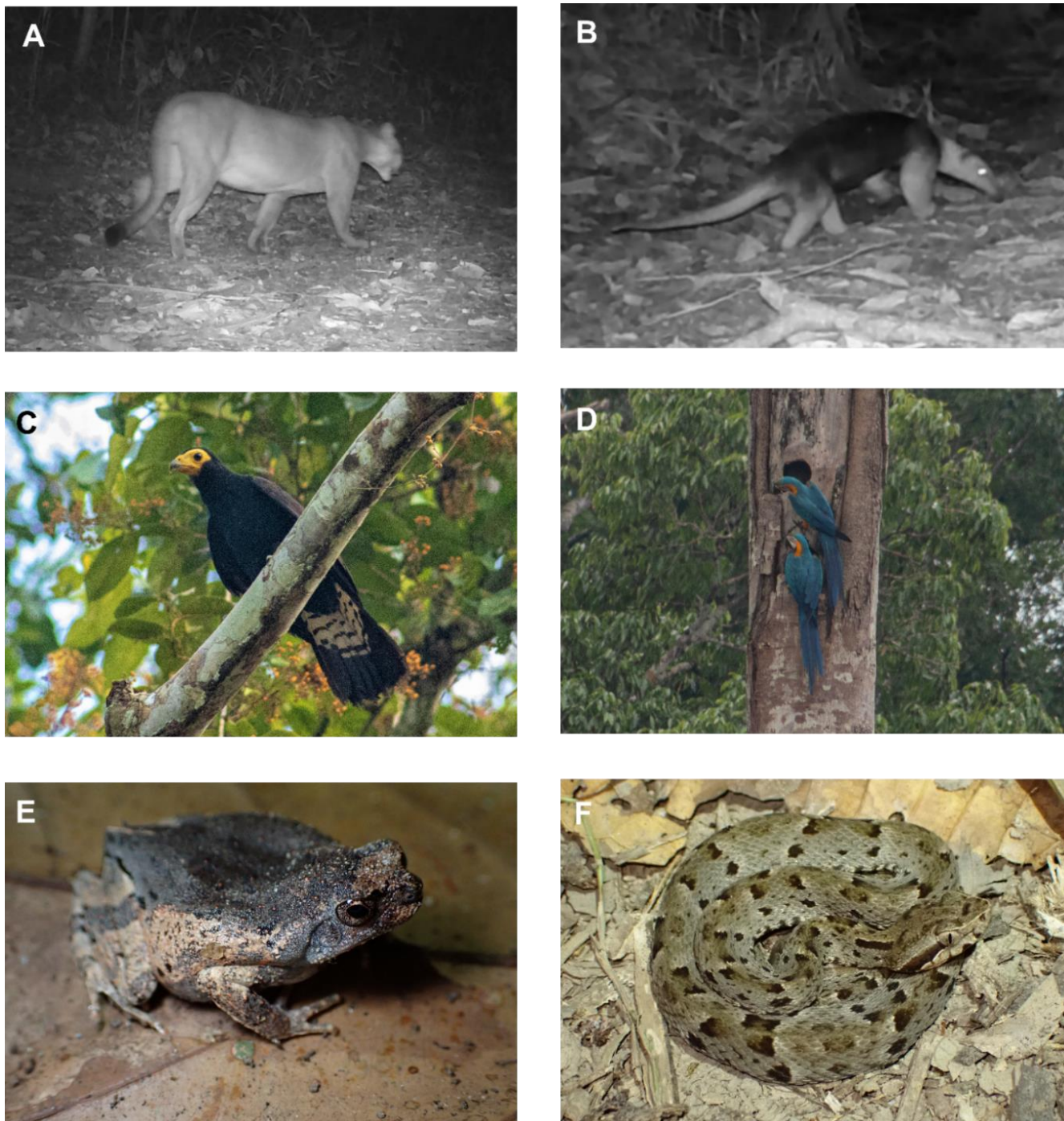


Figure 44. Photographic records of PAI #1. A) *Puma concolor* (onça-parda), B) *Tamandua tetradactyla* (tamanduá-mirim), C) *Daptrius ater* (gavião-de-anta), D) *Ara ararauna* (arara-canindé), E) *Engystomops freibergi*, F) *Bothrops atrox* (jararacuçu). Photos: Paulo Affonso F. P. Neto (birds), Jairo A. Junior (mammals) and Victor A. Fávoro (herpetofauna).

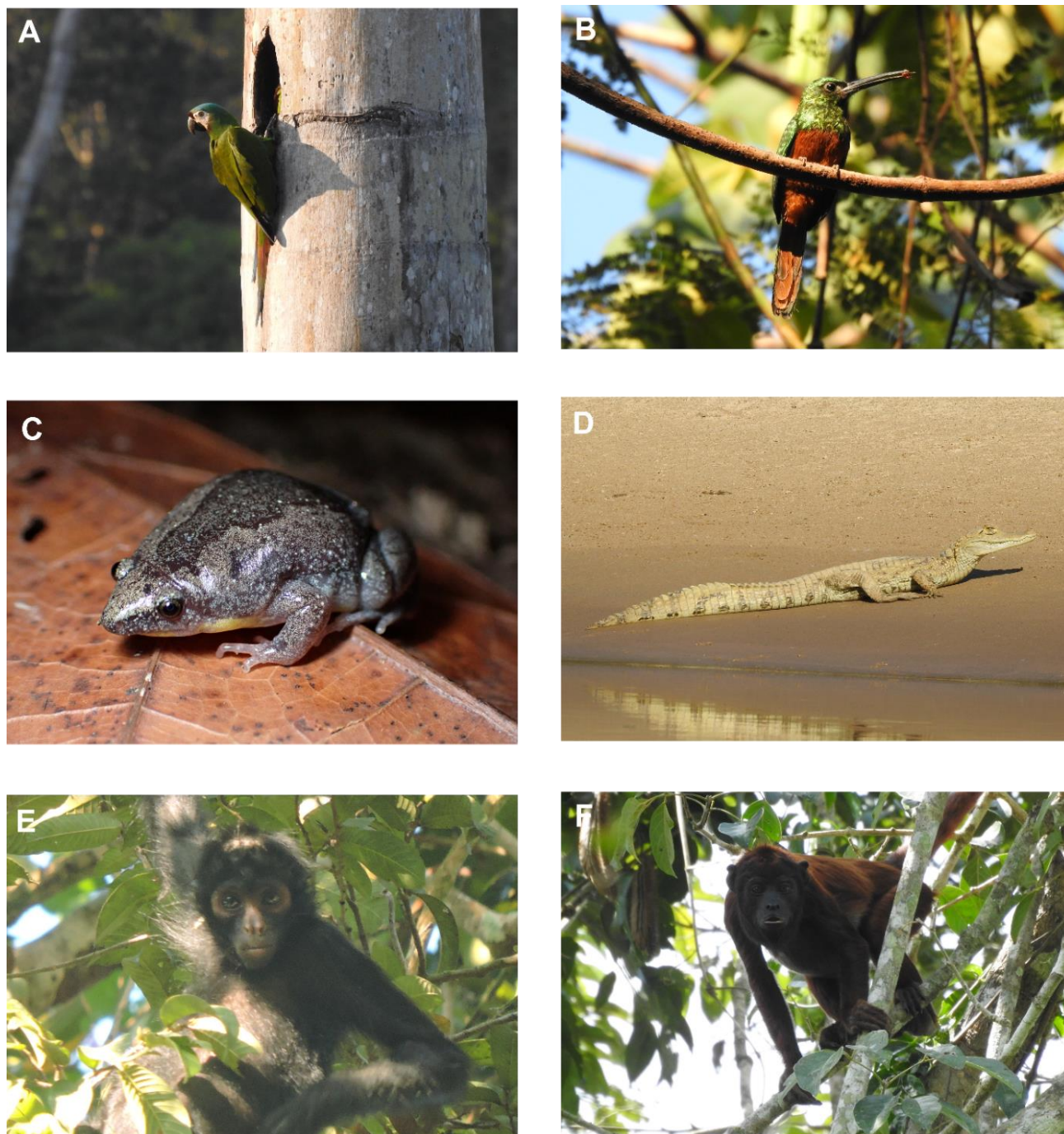


Figure 45. Photographic records of PAIs #2-5 A) *Ara severus*, B) *Galbula cyanescens*, C) *Elachistocleis muiraquitana*, D) *Caiman crocodilus* (jacaretinga), E) *Ateles chamek* (macaco-aranha-de-cara-preta), F) *Alouatta puruensis* (guariba).
Photos: Paulo Affonso F. P. Neto (birds), Jairo A. Junior (mammals) and Víctor A. Fávoro (herpetofauna).

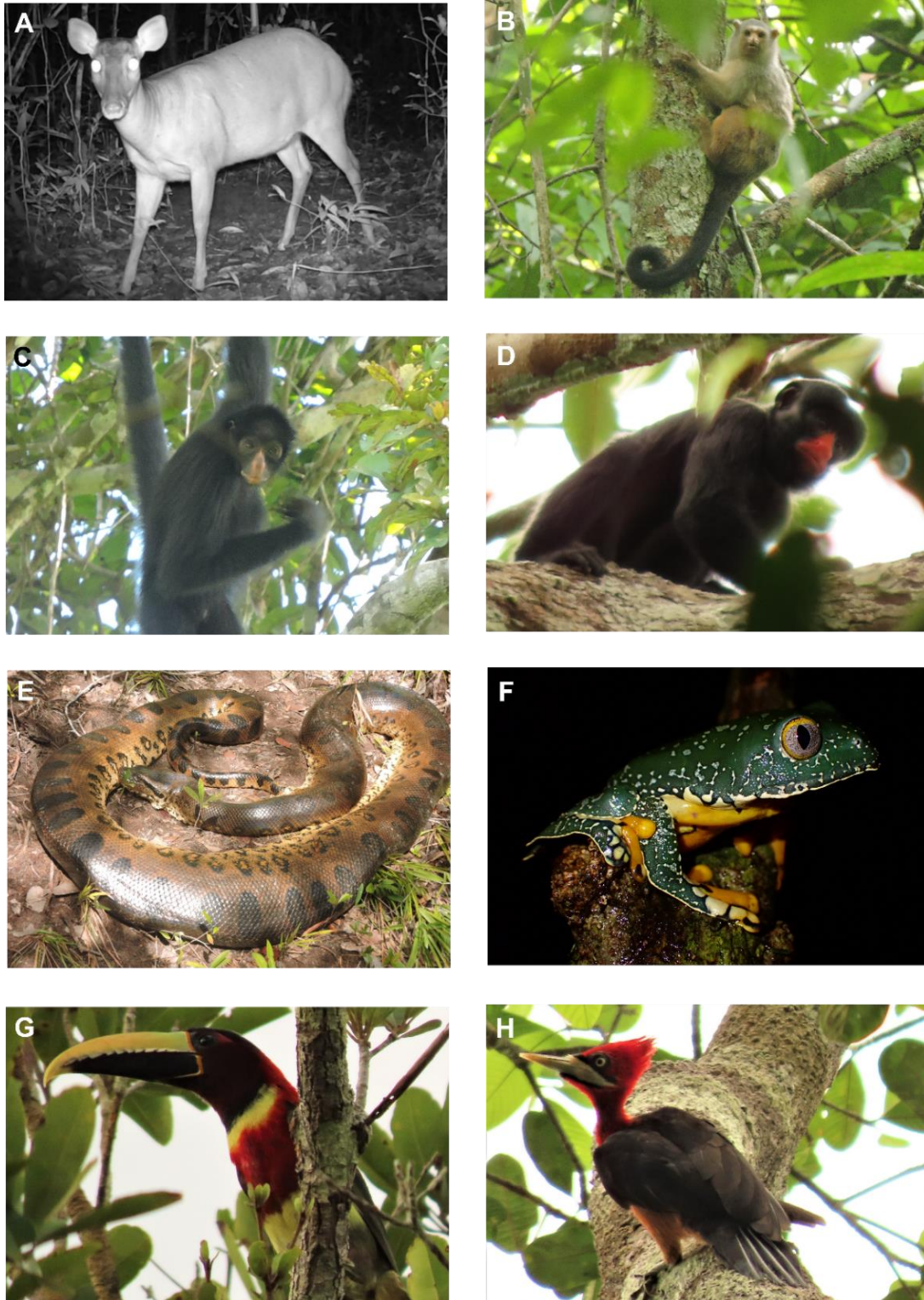


Figure 46. Photographic records of PAI #6. A) *Mazama americana* (veado-mateiro), B) *Mico marcai* (sagui-de-marca), C) *Ateles chamek* (macaco-aranha-de-cara-preta), D) *Chiropotes albinasus* (cuxiú-de-nariz-vermelho), E) *Eunectes murinus* (sucuri-verde), F) *Cruziohyla craspedopus*, G) *Pteroglossus bitorquatus* (araçari-de-pescoço-vermelho), H) *Campephilus rubicollis* (pica-pau-de-barriga-vermelha). Photos: Paulo Affonso F. P. Neto (birds), Jairo A. Junior (mammals) and Victor A. Fávoro (herpetofauna).

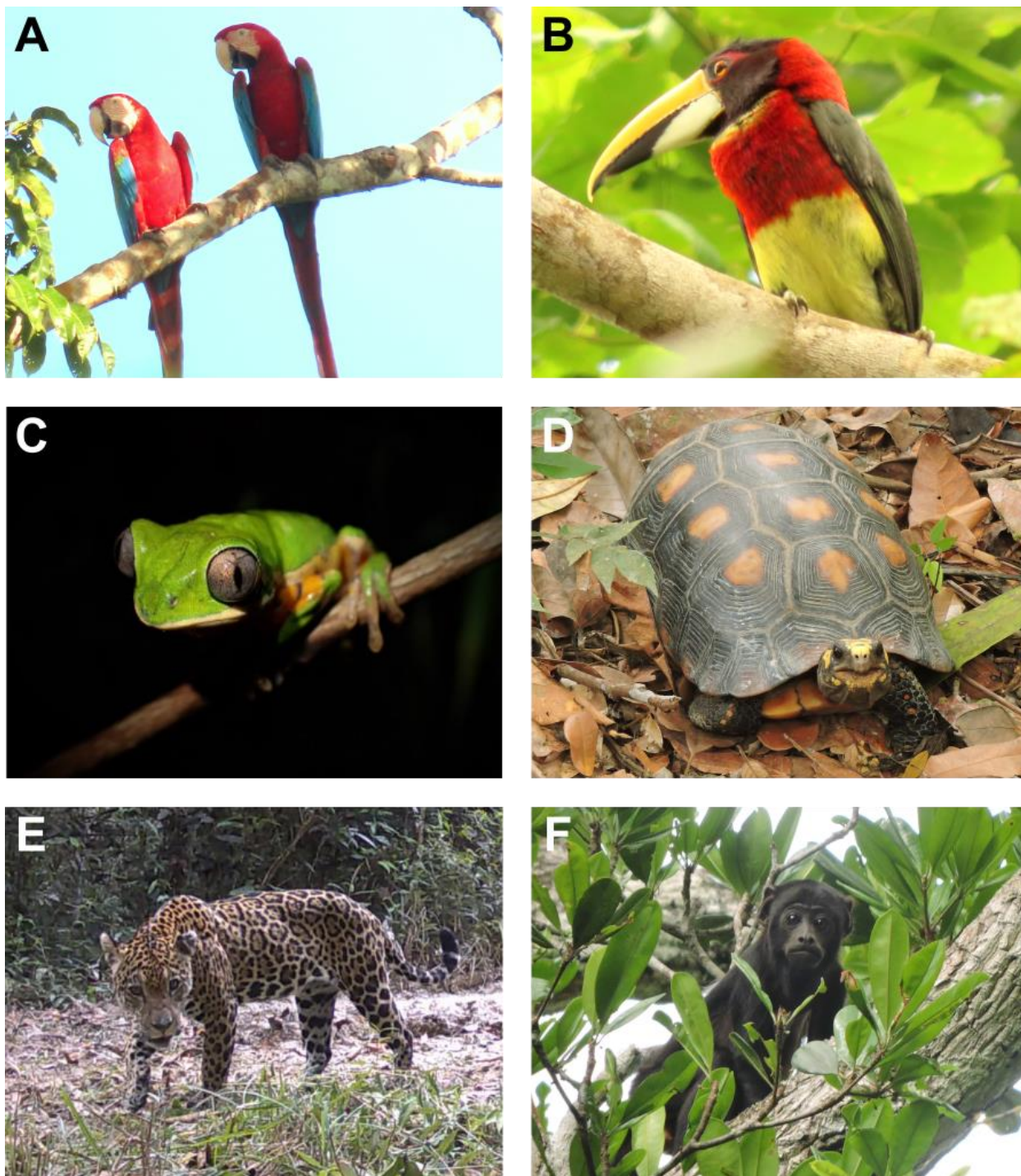


Figure 47. Photographic records of PAIs #7-9. A) *Ara chloropterus* (arara-vermelha). B) *Pteroglossus bitorquatus* (araçari-de-pescoço-vermelho). C) *Pithecopus hypochondrialis*. D) *Chelonoidis denticulatus* (jabuti amarelo). E) *Panthera onca* (onça-pintada). F) *Alouatta belzebul* (guariba). Photos: Paulo Affonso F. P. Neto (birds), Jairo A. Junior (mammals) and Victor A. Fávoro (herpetofauna).

5.3.2 Biodiversity Monitoring Plan Dissemination (B4.3)

The monitoring plan and monitoring results is available on Verra's website, through the full monitoring reports documents. In addition, monitoring results have been posted on BRC's social media, YouTube channel (<https://youtu.be/sUreNYe05CM>) and website page (Appendix III - Biodiversity).

5.4 Optional Criterion: Exceptional Biodiversity Benefits

- High Biodiversity Conservation Priority Status (GL3.1/ GL3.2/ GL3.3/ GL3.4)**

In this monitoring report, the project proponent seeks to include the project in the Gold Level for Exceptional Biodiversity Benefits by meeting the vulnerability criteria set in the Climate, Community & Biodiversity Standards: v3.1 (GL3.1.a). The monitoring revealed the presence of three Endangered (EN) species (*Inia geoffrensis* (boto-vermelho), *Pteronura brasiliensis* (ariranha), and *Ateles chamek*) and one Critically Endangered (CR) species (*Psophia obscura*) within the project area. These species trigger the vulnerability criteria and classify the project area as a Key Biodiversity Area (KBA) (Langhammer et al. 2007). The complete information about the IUCN Red List assessment, species geographic range map, population trends, threats and ecology characteristics are available in Appendix III - Biodiversity.

Table 66. Trigger species, IUCN Red List classification and PAI occurrence.

Species	Nome popular	Class	IUCN Red List Status	Occurrence			
				PAI #1	PAIs #2-5	PAI #6	PAIs #7-9
<i>Ateles chamek</i>	Black-faced Black Spider Monkey (macaco-aranha-de-cara-preta)	Mammal	EN	x	x	x	
<i>Inia geoffrensis</i>	Amazon River Dolphin (boto-vermelho)	Mammal	EN			x	
<i>Pteronura brasiliensis</i>	Giant Otter (ariranha)	Mammal	EN			x	
<i>Psophia obscura</i>	Black-winged Trumpeter (jacamim-de-costas-escuras)	Ave	CR				x

- Ateles chamek*

The geographic range of *Ateles chamek*, popularly known as Black-faced Spider Monkey extend across the northern and central lowlands of Bolivia, western Brazil, and northeastern Peru. *A. chamek* spider monkeys move and forage in the upper canopy of non-flooded lowland forests, semi-deciduous forests, *várzea*, *igapó*

forests and transitional forest-savanna regions in southwestern Amazonia. Although the species lives in large groups of 37-55 individuals, they are usually seen feeding and resting in subgroups of 2-4 individuals (Wallace 2005; Konstant and Rylands 2013). They are highly frugivorous and act as important seed dispersers (Alves et al., 2021). The *Ateles chamek* spider monkey is restricted to primary forest, where it is widespread and relatively common. However, the species does not persist in areas with human activities. The main threats are habitat loss due to deforestation and degradation, and hunting pressure for human consumption. It is estimated that, the species lost more than 15% of its habitat by 2002 and could lose up to 40% of its suitable habitat by 2050 (Rabelo et al., 2018). The IUCN also estimates that the species' population has declined 50% in the last 45 years, a trend that is expected to continue in the future (Alves et al., 2021).

- *Inia geoffrensis*

Inia geoffrensis (boto-vermelho), is a river dolphin found throughout the Amazon and Orinoco River basins in Brazil, Bolivia, Colombia, Ecuador, Peru, and Venezuela. Habitat preference of this species is strongly influenced by seasonal variation in water levels and by animal individual's age and sex (Martin and da Silva 2004b, Martin et al., 2004, Gómez-Salazar et al., 2012). During the low-water season, *I. geoffrensis* are commonly found below channel confluences, whereas during the high-water season, this specie moves to lakes and flooded forests due to the high prey availability (Leatherwood et al., 2000, Aliaga-Rossel 2002, Martin and da Silva 2004a,b). The current population status of *I. geoffrensis* is classified as declining by the IUCN Red List. The main threats to the species survival are incidental mortality from entanglement (bycatch) in fishing gear, intentional killing for bait, as well as habitat degradation caused by human activities (i.e., dam construction, port development, mining, etc.) (da Silva et al., 2018a). Studies regarding the species abundance are scarce (da Silva et al., 2018b; Williams et al. 2016) but the evidence indicates a reduction of 50% or more in total population size from 2000 (beginning of direct killing for bait purpose) to 2075 (da Silva et al., 2018a).

- *Pteronura brasiliensis*

The Giant Otter *Pteronura brasiliensis* is endemic to South America and has a distribution range that extends east of the Andes in the Orinoco, Amazonas, and Parana basins, as well as in the Guianas hydrographic networks (Groenendijk et al., 2022). Nowadays, however, the distribution is discontinuous and fragmented due to local extinctions. Populations in Uruguay and Argentina are considered extinct, and in Paraguay the species occupies less than 2% of its former range (Groenendijk et al., 2022). In Brazil, the species is considered extinct in eastern Tocantins and Paraná basins. *P. brasiliensis* are social animals that inhabit undisturbed large rivers, streams, lakes, and swamps with high-quality vegetation cover and high prey density. The species' diet is opportunistic, feeding almost exclusively of fish but may also include caiman and other vertebrates (Ribas et al., 2012, Rosas-Ribeiro et al., 2012).

In the early 1970s, the Giant Otter *Pteronura brasiliensis* was threatened with extinction in Ecuador, Colombia, Venezuela, Bolivia, and Brazil due to hunting for pelt trade (Duplaix 1980). By the end of the decade,

joint efforts and the listing of the species on Appendix I of the Convention on International Trade in Endangered Species (CITES) ended the economic benefits and ceased the Giant Otter international trade (Recharte and Bodmer 2010). Studies indicate a population of 4,659 individuals in Brazil, of which about 1,200 are breeding individuals (Tomas et al. 2015); (Evangelista and Rosas 2011); (Palmeirim et al. 2014); (Lima et al. 2014); (Georgiadis et al. 2015). The species is mainly threatened by human activities such as destruction of riparian zones, overfishing, water contamination by mining and pesticides, diseases spread by domestic animals, mismanaged tourism, drowning in fishing nets, and captivity as pets (Groenendijk et al., 2022). In addition, the Giant Otter are also often killed by fishermen and local residents who blame the animals for depleting fish resources (Groenendijk et al., 2022). It is estimated that all of these threats have resulted in a population decline of more than 50% over the past 25 years (Groenendijk et al. 2014).

- *Psophia obscura*

The *P. obscura* is a large-bodied (>1kg), terrestrial bird species popularly known as black-winged trumpeter (jacamim-de-costas-escuras). The species is endemic to the Brazilian Amazon with occurrence restricted to Belem Center of Endemism, one of the oldest deforestation frontiers of the biome. The species distribution range extends from the eastern Amazon to the east of Tocantins River in northeastern Para and northwestern Mato Grosso (BirdLife International, 2018). The trumpeters are forest-interior specialists, and deforestation and forest fragmentation are the main threats to the species' survival. Moreover, their large body characteristics and group living behavior makes them very attractive for hunters (Carvalho et al., 2022).

Is estimated that the population of *P. obscura* is decreasing, and recent studies performed within and nearby the project zone estimate the population size to be less than a few hundred of individuals distributed among two disjunct groups (Lees et al., 2012; BirdLife International, 2018). One of the known groups is located within the project zone, in the municipality of Paragominas and the other group is located outside the project zone, in the Gurupi Biological Reserve and contiguous Indigenous Land (Lees et al., 2012; BirdLife International, 2018; Carvalho et al., 2022). The species distribution range goes from eastern Amazonia to east of the Tocantins River in northeastern Para and northwestern Mato Grosso (BirdLife International, 2018).

5.4.1 Trigger Species Population Trends (GL3.3)

Table 67. Trigger Species Population Trends.

Trigger Species	<i>Ateles chamek</i>
With-project Scenario	Project activities aim to ensure the survival of the trigger species through the conservation of the forest cover and preventing legal and illegal deforestation within the project area. The project area serves as a remnant of biodiversity in a landscape that is mostly dominated by grazing and agriculture

Trigger Species	<i>Inia geoffrensis</i>
With-project Scenario	Project activities aim to ensure the survival of the trigger species by maintaining forest cover and preventing legal and illegal deforestation within the project area. The project area serves as a remnants of biodiversity remnants in a landscape largely dominated by grazing and agriculture.

Trigger Species	<i>Pteronura brasiliensis</i>
With-project Scenario	Project activities aim to ensure the survival of the trigger species by maintaining forest cover and preventing legal and illegal deforestation within the project area. The project area serves as a remnants of biodiversity remnants in a landscape largely dominated by grazing and agriculture.

Trigger Species	<i>Psophia obscura</i>
With-project Scenario	The project activities aim to maintain the survival of the trigger species through the conservation of the forest cover and avoidance of legal and illegal deforestation within the project area. The project area acts as biodiversity remnants in a landscape that is mostly dominated by grazing and agriculture.

6 ADDITIONAL PROJECT IMPLEMENTATION INFORMATION

Not applicable. No additional information on the project implementation is needed.

7 ADDITIONAL PROJECT IMPACT INFORMATION

Not applicable. No additional information on the project impacts is needed.

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