NON-PERMANENCE RISK REPORT

Document Prepared by Carbonext Tecnologia em Soluções Ambientais Ltda

Project Title	Hiwi REDD+ Project
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CONTENTS

1 INTERNAL RISK

Project Management		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Species planted (where applicable) associated with more than 25% of the stocks on which GHG credits have previously been issued are not native or proven to be adapted to the same or similar agro-ecological zone(s) in which the project is located. Not applicable: the project does not involve plantations.	0
b)	Ongoing enforcement to prevent encroachment by outside actors is required to protect more than 50% of stocks on which GHG credits have previously been issued. Not applicable: GHG credits have not previously been issued.	0
c)	Management team does not include individuals with significant experience in all skills necessary to successfully undertake all project activities (i.e., any area of required experience is not covered by at least one individual with at least 5 years' experience in the area). Not applicable, as the Management team does include individuals with significant experience in all skills necessary to successfully undertake all project activities. According to the AFOLU Non-Permanence Risk Tool V.4.0, the management team is those responsible for day-to-day project management and the implementation of project activities, and/or carbon project development partners who have contractual commitments to support the activities of the project. Specifically, the Management Team who will carry out the technical aspects of the project activities and management have the following skills and experience: Janaina Dallan – CEO at Carbonext. Working in the coordination of projects related to sustainability strategy and projects to the Clean Development Mechanism. Part of the UNFCCC Registration and Issuance Team as an Expert. Has a bachelor's degree in Forestry Engineering and a Master's in business of the environment. Carbon markets specialist based in São Paulo working specifically in the carbon credit development department being responsible of managing the Brazilian projects and participating as a reviewer of projects in other countries, was part of the international Carbon Assets Team of Ecofys. Working with Carbon Market issues since 2002 when she worked with the Center for Advanced Studies on Applied Economics at the University of São Paulo while participating in two projects directed by the Ministry of the Environment. Ms. Dallan later managed CDM projects and Carbon market activities at the company Golder Associates São Paulo and provided support to other Golder offices throughout Latin American countries and North America. She has also worked as a Carbon Markets	0

consultant for an Energy company being responsible for the implementation of the CDM department including staff training, project advisor and staff coordination.

More information at: https://www.linkedin.com/in/janainadallan/

Luiz Fernando de Moura – Forestry Engineer, M.Sc. and Ph.D. in Wood technology by the Université Laval (Quebec, Canada). He is responsible to coordinate the technical group at Carbonext, working with projects for the Carbon Markets including AFOLU projects. Dr. de Moura has participate as project designer in Florestal Santa Maria REDD Projet, Fortaleza Ituxi REDD project and Evergreen REDD project.

More information at: https://www.linkedin.com/in/luiz-fernando-de-moura-6077089/

Francy Rosy Nava de Oliveira e Souza – Environmental Engineer at Carbonext: Graduated in Environmental Engineering at the Universidade Estadual do Pará (UEPA), Brazil. Ms. Nava has specialized her education in Environmental Management at Faculdade Oswaldo Cruz and Instituto de Pós Graduação de Goiás. During her professional career she worked as environmental consulting, as coordinator in different sustainable projects, developing REDD+ project among others. Currently, Ms. Nava is a REDD+ project developer coordinator at Carbonext.

More information at: https://www.linkedin.com/in/francy-nava-47950397/

Furthermore, Carbonext's technical team has experienced professionals in several areas of knowledge necessary for the planning and monitoring of the project, such as forestry engineers, social workers, biologists, oceanographers, geoprocessing analysts and other related areas.

Based on the team's expertise, the Project Proponent and Project Developers are well qualified and confident to claim that the project generates climate, community and biodiversity benefits.

d)	Management team does not maintain a presence in the country or is located more than a day of travel from the project site, considering all parcels or polygons in the project area.	0

Not applicable. The Management Team maintains a presence in the country and is located less than a day of travel from the project site, considering all parcels or polygons in the project area.

Carbonext has offices in the city of São Paulo, State of São Paulo, and in the city of Belém, State of Pará.

Travel time from Carbonext offices to the project area is summarized in the table below (The evidence for this is made available to auditors[1]):

[1] Evidence available for audit team at: Audit PD & MR\Evidence\SCNR 2 Project Actitivies Costs - Ticket Purchase Receipt_Aline and Ticket Purchase Receipt_Levi

	<table><tr><th>Departing From</th><th>Total Travel Time to Bujari[1]</th></tr><tr><td>São Paulo</td><td>5h</td></tr><tr><td>Belém</td><td>7h</td></tr></table> Additionally, on the farms there is the presence of internal workers, which in the PD we call internal community (Section 4.1.1). There are people constantly working and living on the project farms, demonstrating constant presence of people quite close to the project area.	
e)	Mitigation: Management team includes individuals with significant experience in AFOLU project design and implementation, carbon accounting and reporting (e.g., individuals who have successfully managed projects through validation, verification and issuance of GHG credits) under the VCS Program or other approved GHG programs. For the team experience see details presented in item "c" above.	-2
f)	Mitigation: Adaptive management plan in place: Some important actions have already been carried out before the project start date and further monitoring actions will be implemented. <u>Actions carried out before the start date</u> • Project Area Boundary Demarcation; • Ground patrolling of the project boundaries. <u>Actions to be carried out during the first MR:</u> • Purchase of a 4WD Vehicle Reinforcement of Surveillance • Ground patrolling of the project boundaries; • Hiring a Person to Support the Monitoring of the Project Area; • Construction of Surveillance Base; • Purchase of more 2 4WD Vehicles Reinforcement of Surveillance • Purchase of Motorcycle for Periodical Monitoring Patrols • Drone Flight Patrolling of the Project Boundaries • Purchase of Quadricycle 4WD for Periodical Monitoring Patrols • Fire Brigade Training with the Employees of the Properties and Communities. • Two onsite Visit and Meetings with the Communities <u>Further actions:</u>	-2

	The Hiwi project will implement a continuous monitoring Plan called Forest Integrity Plan (FIP) to strengthen the protection of forests in the project area. The Forest Integrity Plan will consist of a set of preventive actions, such as remote monitoring and ground monitoring. For remote monitoring, the MonitoraCarbon alert system will be used. It is an automatic deforestation detection system through weekly monitoring by satellite images. For terrestrial monitoring, monthly surveillance patrols will be carried out on pre-established routes to inspect forest conditions within the project area. In addition, training on firefighting will be implemented (Property Control and Fire Fighting)[2], where personal protective equipment and first aid kits will be made available (more detailed in section 2.3.17). More detailed can be found in sections 2.3.17 Occupational Safety Assessment (G3.12), 3.3.3 Monitoring Plan, 4.1.4 Without-Project Scenario: Community (CM1.3) and 4.5.2 Short-term and Long-term Community Benefits (GL2.2) of the Project Description[3].	
Total Project Management (PM) [as applicable, (a + b + c + d + e + f)] Total may be less than zero.		-4

Financial Viability		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	This is not the case for the present project	0
b)	This is not the case for the present project	0
c)	This is not the case for the present project	0
d)	The project cash flow breakeven point was found to be less than 4 years from the current risk assessment, by financial analysis. As shown in the "Financial viability"[4] spreadsheet, which has been made available to auditors, the project cashflow reaches breakeven (i.e., annual profits become positive, and stay positive) in 2022 (year 3) of the project, in scenarios involving conservative CCB credit prices of USD 10.00/VCU. The financial spreadsheet, along with evidence of financial health is available to auditors.	0
e)	This is not the case for the present project.	0
f)	This is not the case for the present project.	0
g)	This is not the case for the present project.	0

[2] Evidence available for audit team at: Audit PD & MR\Evidence\Operating Procedure
[3] Evidence available for audit team at: Audit PD & MR\PD & MR01
[4] Evidence available for audit team at: Audit PD & MR/ NPRR & Additionality

h)	The project was found to have secured 80% or more of funding needed to cover the total cash out before the project reaches breakeven, through a balance analysis. Specifically, as shown in the "Financial Analysis Hiwi"[5] spreadsheet, a conservative estimate of funding needed is of R$ R$ 708.336,34 (total cash out up until breakeven point), and the project proponents have this sum, in its entirety, available on call. The evidence for this is made available to auditors. Furthermore, the proponents have independent wealth and alternative means to generate income from their properties. This will provide a buffer if the carbon market performs poorly. Risk of technical failure is furthermore considered to be very low, as the project has limited technical requirements from this point. No advancements in technologies or maintenance of technical systems are required for the project's success.	0
i)	Mitigation: The project was found to have available callable financial resources of at least 50% of total cash out before project reaches breakeven, which sum was defined in financial analysis ("Financial Analysis Hiwi") as R$ 708.336,34. Evidence of this was made available at audit.	-2
Total Financial Viability (FV) [as applicable, ((a, b, c or d) + (e, f, g or h) + i)] Total may not be less than zero.		0

Opportunity Cost		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	NPV from the most profitable alternative land use activity is expected to be at least 100% more than that associated with project activities; or where baseline activities are subsistence-driven, net positive community impacts are not demonstrated This is not the case for the present project.	0
b)	NPV from the most profitable alternative land use activity is expected to be between 50% and up to 100% more than from project activities This is not the case for the present project.	0
c)	NPV from the most profitable alternative land use activity is expected to be between 20% and up to 50% more than from project activities This is not the case for the present project.	0
d)	NPV from the most profitable alternative land use activity is expected to be between 20% more than and up to 20% less than from project activities; or where baseline activities are subsistence-driven, net 0positive community impacts are demonstrated This is not the case for the present project.	0

[5] Evidence available for audit team at: Audit PD & MR/ NPRR & Additionality

e)	NPV from project activities is expected to be between 20% and up to 50% more profitable than the most profitable alternative land use activity This is not the case for the present project.	0
f)	NPV from project activities is expected to be at least 50% more profitable than the most profitable alternative land use activity. The NPV from project activities was found to be at least 50% more profitable than the most profitable alternative land use activity (beef cattle farming), as demonstrated in the "Financial Analysis Hiwi" spreadsheet. The NPV from the project was more than 50% more profitable than the semi-intensive beef cattle farming, in a conservative analysis, once extensive cattle farming is much more the common practice than other more yielding production systems[6]. Data from beef cattle farming from a region near the project area[7] was used to calculate the BAU NPV, that resulted in R$ 1,511,311.87. The project NPV was of R$ 44,201,330, 2,824.7% higher than the BAU. The evidence of this was made available to the audit team[8].	-4
g)	Mitigation: Project proponent is a non-profit organization This is not the case for the present project.	0
h)	Mitigation: Project is protected by legally binding commitment (see Section 0) to continue management practices that protect the credited carbon stocks over the length of the project crediting period. The project area is protected by a legally binding commitment, specifically, the contract between the project developer (Carbonext) and the project proprietors, which was made available at audit. The latter requires the conservation of forest land on the entire REDD Project Area, over the length of the project crediting period, protecting carbon stocks within it.	-2
i)	Mitigation: Project is protected by legally binding commitment (see Section 0) to continue management practices that protect the credited carbon stocks over at least 100 years This is not the case for the present project.	0
Total Opportunity Cost (OC) [as applicable, (a, b, c, d, e or f) + (g + h or i)] Total may be less than 0.		-6

[6] Zu Ermgassen, E. K., et al. Results from on-the-ground efforts to promote sustainable cattle ranching in the Brazilian Amazon. Sustainability, 10(4), 1301, 2018. Available at: https://www.mdpi.com/2071-1050/10/4/1301 (last visit on 05/31/2023)

[7] https://idesam.org/publicacao/relatorio-viabilidade-pecuaria.pdf

[8] Evidence available for audit team at: Audit PD & MR/ NPRR & Additionality

Project Longevity		
a)	Without legal agreement or requirement to continue the management practice: **This is not the case for the present project**	0
b)	With legal agreement or requirement to continue the management practice: **As discussed in point h) above, the project has a legal agreement or requirement to continue the management practice, and theproject longevity is 30 years.** **This constitutes a legal agreement to continue the management practice over 30 years, as the logging cycle occurs in this time period.** **Additionally, the Legal Reserve (LR) (at least 80% of the property) is registered in property deeds at the Real Estate Registry Office: its location is publicly known. Brazilian Forest Code determines that, once allocated, LRs may not be changed even in cases of real estate transfer, land dismembering or area rectification.** **According to the tool the calculation is then = 30 - (project longevity/2), resulting in 15 in this case.**	15
Total Project Longevity (PL) May not be less than zero		15

Internal Risk	
Total Internal Risk (PM + FV + OC + PL) Total may not be less than zero.	5

2 EXTERNAL RISKS

Land Tenure and Resource Access/Impacts		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Ownership and resource access/use rights are held by same entity(s). Yes, the ownership and resource access/use rights are held by same entities, as evidenced by the land-use and land ownership documents evidenced at audit under the category "Ownership"[9].	0
b)	Ownership and resource access/use rights are held by different entity(s) (e.g., land is government owned and the project proponent holds a lease or concession). This is not the case for the present project.	0
c)	In more than 5% of the project area, there exist disputes over land tenure or ownership. There are no disputes over land tenure or ownership in the project area. The landowners have the Registry of Property and the "Cadeia Dominial" of each propriety, which is a study carried out with the Real Estate Registry Office for a particular property, identified through the registration number. It includes monitoring the chronological sequence and recording all transmissions that took place on the same terrain (for example, if there was any dismemberment and/or subdivision, the pledges that fell on the property); covers from the current owner to the origin of ownership, commonly from the Judiciary: State, Union, INCRA, among others. All these documents are available for audit.	0
d)	There exist disputes over access/use rights (or overlapping rights): There are no disputes regarding access/ land use rights. Relying on the same evidence as c) above, we prove that this is not the case through the evidence provided under "Ownership"[10]. Furthermore, of the 70 community members personally interviewed as part of the public consultation, residents of the surrounding the project area, none of them responded that they knew of any conflicts regarding	0

[9] Evidence available for audit team at: Audit PD & MR\Evidence\Ownership
[10] Evidence available for audit team at: Audit PD & MR\Evidence\Ownership

	land tenure or ownership, relating to the project area. Evidence for this was presented at audit under the category "Community Consultation"[11].	
e)	WRC projects unable to demonstrate that potential upstream and sea impacts that could undermine issued credits in the next 10 years are irrelevant or expected to be insignificant, or that there is a plan in place for effectively mitigating such impacts: The Hiwi REDD project is not classified as WRC, so this is not the case for the present project.	0
f)	Mitigation: Project area is protected by legally binding commitment (e.g., a conservation easement or protected area) to continue management practices that protect carbon stocks over the length of the project crediting period: Yes, the project area is protected by legally binding commitment to continue management practices that protect carbon stocks over the length of the project crediting period. As discussed in section h) of the Opportunity Cost section, the project proponents have committed to continue the forest conservation activities over the 30-year project lifetime in a contract with Carbonext, evidence for which has been made available during audit.	-2
g)	Mitigation: Where disputes over land tenure, ownership or access/use rights exist, documented evidence is provided that projects have implemented activities to resolve the disputes or clarify overlapping claims This is not the case for the present project. As mentioned in item d), there is no disputes over land tenure, ownership or access/use rights.	0
Total Land Tenure (LT) [as applicable, ((a or b) + c + d + e + f + g)] Total may not be less than zero.		0

[11] Evidence available for audit team at: Audit PD & MR\Evidence\Stakeholders\Community Stakeholders\Public Consultation –Declaration of Consent

<table>
<tr><th colspan="3">Community Engagement</th></tr>
<tr><th>Risk Factor</th><th>Risk Factor and/or Mitigation Description</th><th>Risk Rating</th></tr>
<tr><td>a)</td><td>Less than 50 percent of households living within the project area who are reliant on the project area, have been consulted:

There are no residents within the Project Area.</td><td>0</td></tr>
<tr><td>b)</td><td>Less than 20 percent of households living within 20 km of the project boundary outside the project area, and who are reliant on the project area, have been consulted.

In general, the area is not used by the community, but only sporadically by residents located on the border with a part of the project area. However, no one relies on the project area. During the public consultation, only 3 people were identified to use the project area and were consulted. Two of them said that they enter the area once a year only. Other 81 community members were interviewed and stated that they don't use nor are reliant on the project area.

From the total households living within the 20-km buffer of the project area, according to official statistics, 348 of them work in activities related to the forest, such as agriculture, livestock, forestry production, fisheries and aquaculture. If applied the 20% on this number, the number of householders to be consulted is 70. During the community public consultation, 85 people were consulted. As mentioned, of those, 4 use the project area sporadically.

The calculation method to identity the focal group was as follows :

<table>
<tr><td>Total Population Living in the 20km-buffer</td><td>1346</td></tr>
<tr><td>Number of people in Bujari that works with forestry activities*</td><td>1543</td></tr>
<tr><td>Rural Population of Bujari*</td><td>5980</td></tr>
<tr><td>% of the rural population that works with forestry activities*</td><td>26%</td></tr>
<tr><td>Number of people in the 20-km buffer that works with forestry activities</td><td>348</td></tr>
</table>
*Data from IBGE[12]

20% of the 347 people, represents 70 people[13].

More detailed information regarding this topic can be found in item 2.1.8 (G1.5) and chapter 4- Community on the Project Description.</td><td>0</td></tr>
</table>

[12] https://cidades.ibge.gov.br/brasil/ac/bujari/pesquisa/23/25124

[13] Evidence available for audit team at: Audit PD & MR\Evidence\Stakeholders\Community Stakeholders\Public Consultation

c)	Mitigation: The project generates net positive impacts on the social and economic well-being of the local communities who derive livelihoods from the project area **The project will develop activities that will bring positive impacts to the communities, with the expected results being:** • **Empowering the community inserted in Leakage Management Area to develop the skills of social organizations and local leaders through capacity building and training, so that they can obtain new alternatives and income opportunities;** • Increase employment rate by hiring community members and local people to work for the project; • **Train farm employees and the local community to prevent and combat incidents of forest fires in the project area, therefore, empowering local people and preserving biodiversity;** • **Identification of illegal deforestation to act as quickly as possible, reducing deforestation while preserving biodiversity;** • **Increase women's financial autonomy by offering technical courses and offering opportunities;** • **Increase in general knowledge and technical training, with ways of developing awareness on subjects as climate change, environmental conservation and restoration and increasing the income of the local population;** • **Mapping and monitoring of fauna and flora species.** **Detailed information on the planned activities can be found in Section 2.1.11 and Section 4 of the PD.**	-5
Total Community Engagement (CE) [where applicable, (a + b + c)]		-5
Total may be less than zero.		

Political Risk		
Risk Factor	**Risk Factor and/or Mitigation Description**	**Risk Rating**
a)	Governance score of less than -0.79: **Not applicable.**	0
b)	Governance score of -0.79 to less than -0.32: **Not applicable.**	0
c)	Governance score of -0.32 to less than 0.19: **A governance score was calculated from the mean of Governance Scores across the six indicators of the World Bank Institute's Worldwide Governance Indicators (WGI)[14] listed below:**	2

[14] World Bank Institute Worldwide Governance Indicators, available at: https://info.worldbank.org/governance/wgi/ (last visit on: 7/28/2022)

	• Voice and Accountability • Political Stability and Absence of Violence/Terrorism • Government Effectiveness • Regulatory Quality • Rule of Law • Control of Corruption Furthermore, the score was averaged over the most recent five years of available data (2020 – 2016). Therefore, the governance score is -0,203 The spreadsheet (WGI Data) with the rationale for the calculation is available for checking.	
d)	Governance score of 0.19 to less than 0.82: **Not applicable.**	0
e)	Governance score of 0.82 or higher: **Not applicable.**	0
f)	Mitigation: Country is implementing REDD+ Readiness or other activities. Yes, Brazil is implementing REDD+ Readiness or other activities set out in the AFOLU Non-Permanence Tool, including: a) The country is receiving REDD+ Readiness funding from the FCPF, UN-REDD or other bilateral or multilateral donors b) The country is participating in the CCBA/CARE REDD+ Social and Environmental Standards Initiative c) The jurisdiction in which the project is located is participating in the Governors' Climate and Forest Taskforce d) The country has an established national FSC or PEFC standards body e) The country has an established Designated National Authority under the CDM and has at least one registered CDM Afforestation/Reforestation project	-2
Total Political (PC) [as applicable ((a, b, c, d or e) + f)] Total may not be less than zero.		0

External Risk	
Total External Risk (LT + CE + PC) Total may not be less than zero.	0

3 NATURAL RISKS

Natural Risk (Fire - "F")	
Significance	Since August 2022, Mapbiomas[15] Brazil has made available the history of mapping fire scars in Brazil, in addition to an updated collection of land use and land cover maps. This fire scar database was used to assess the occurrence of wildfires in the project area during the historical period from 2009 to 2019, as well as to assess whether there was loss of biomass by fire in the area. These data are based on Landsat satellite image mosaics with a spatial resolution of 30 meters, available from 1985 to 2022, with a return interval of 16 days. The images below show the burn history through the fire scars for all farms in the project.

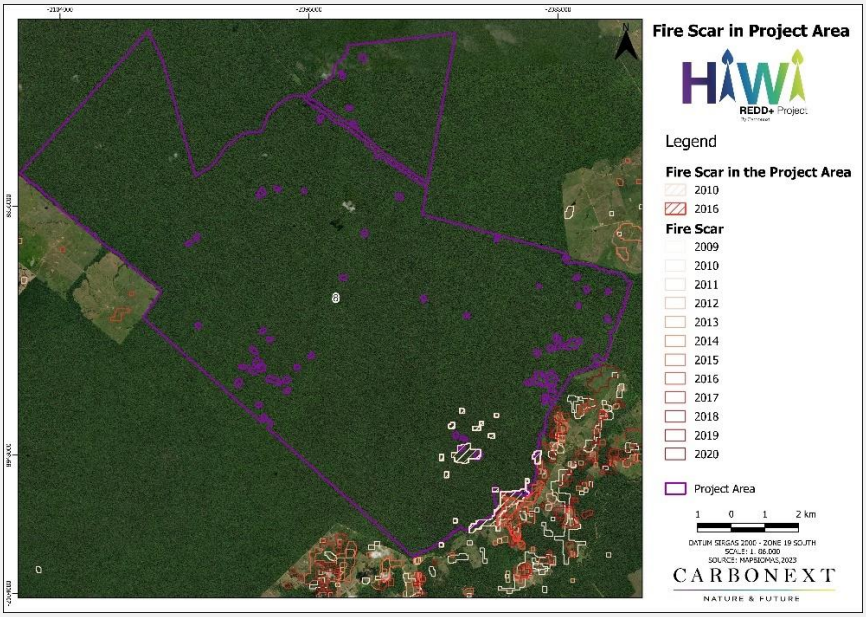

Figure 1. Occurrence of fire scars during the historical period (2009-2020) at PA-1 Fazenda Bella Aliança.

The data show that in 2010 the PA-1 (Fazenda Bella Aliança) presented data of fire marks in the project area, although the images available for the year 2010 do not show a loss of internal biomass that identifies the pattern of burning. We believe this point may be associated with nearby non-forest areas, which had already been removed from the project area. The year 2016 also has fire scars, but on the edge of the project area and may be associated with non-forest areas around it, as shown in the image. We're confident that the spatial resolution of the data can generate a false positive of extrapolation for the project area, associated with non-forest areas and not belonging to the project, more susceptible to the occurrence of fires because they are areas with constant change in use from soil.

[15] https://mapbiomas.org/metodo-mapbiomas-fogo-1

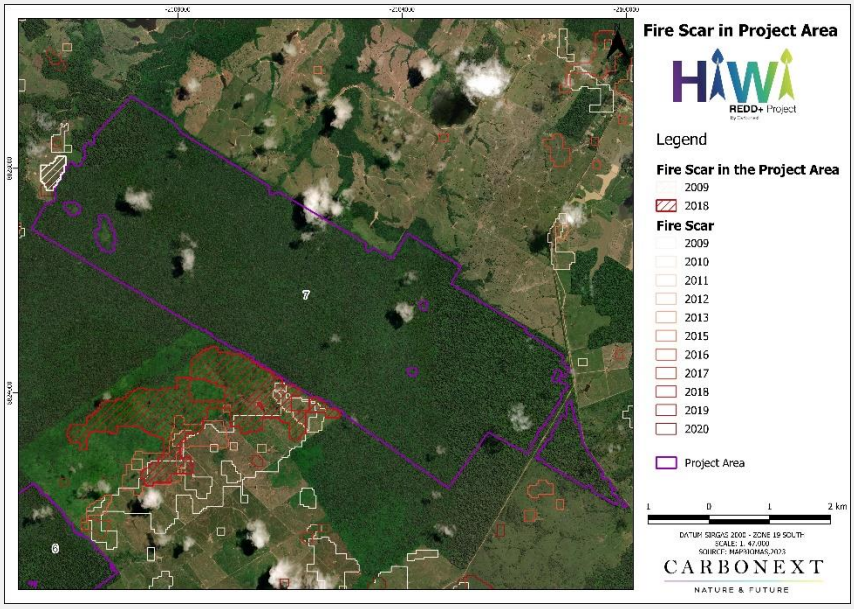

Figure 2. Occurrence of fire scars during the historical period (2009-2020) at PA-2 Fazenda Ipanema.

The PA-2 (Fazenda Ipanema) does not show fire scars within the project area, but in 2009 and 2018, cases of fire were identified that compromised the biomass in the areas bordering the project, associated with non-forest areas around it. Due to the special resolution of the data, we disregard the loss of biomass within the project area in PA-2.

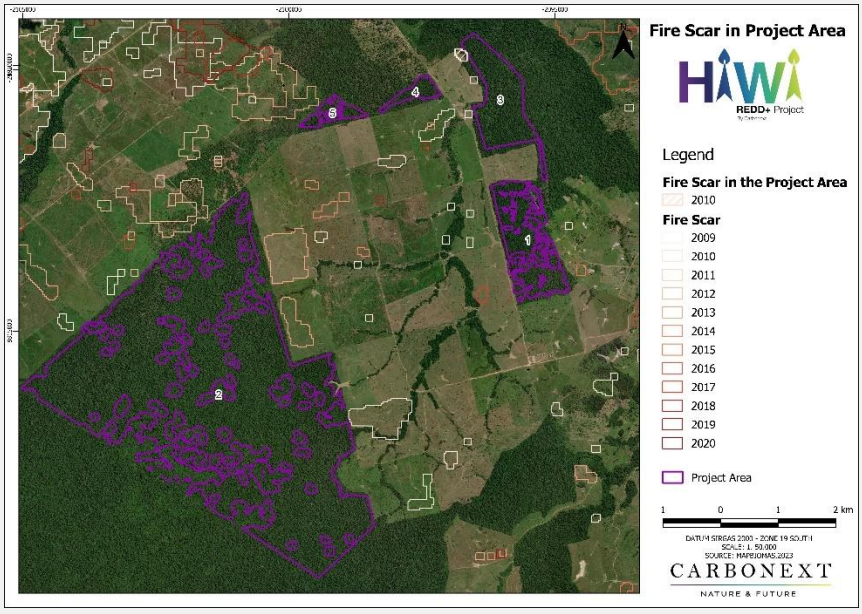

Figure 3. Occurrence of fire scars during the historical period (2009-2020) at PA-3 Fazenda Copacabana.

The PA-3 (Fazenda Copacabana) also has no fire scars within the project area, a case of fire scars from 2010 shows compromised biomass in the area bordering the project, also associated with non-forest areas in the region. In this case, we again disregard the biomass loss within the project area in the PA-3 due to the special resolution of the data.

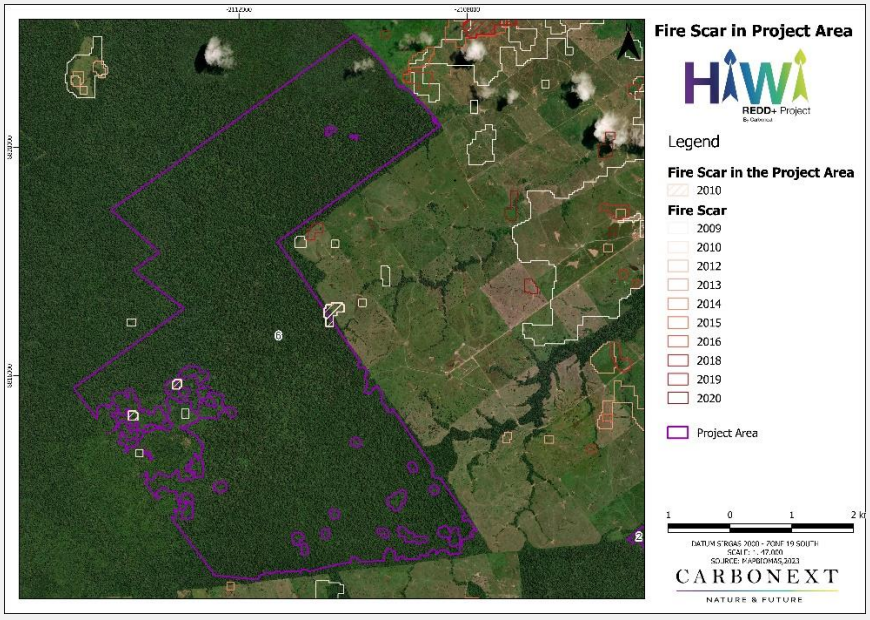

Figure 4. Occurrence of fire scars during the historical period (2009-2020) at PA-4 Fazenda Leblon.

The PA-4 (Fazenda Leblon) has scars from the 2010 fire in the project border area, and also in areas closer to internal areas of the project but not forest areas, which for this reason had already been removed from the project area. In this case, we again disregard the biomass loss within the project area in the PA-4 due to the special resolution of the data.

In this way, we consider that there was no significant loss of biomass within the project area, during the historical period of 10 years. It can be observed that the occurrence of forest fires is associated with areas already modified and degraded, considered as non-forests, where the response of tropical tree growth, increase in atmospheric carbon dioxide concentration, fire management, and deforestation trends can lead to widespread degradation or loss of the Amazon rainforest[16] [17].

When analyzing the data, it can be observed that the years with the highest number of fire scars are associated with drought events in the region, the years 2010[18] and 2016[19] were atypical years of drought and reflect how any change to drier conditions favors adaptation to drought species that store less carbon[20]. Thus, repeated droughts can have important decadal-scale impacts on the global carbon cycle and occur concurrently with peaks in fire activity[21].

The years 2018 and 2019 were not years of extreme drought, nor were they suffering from El Niño. Even so, August 2018 began the peak of fires in the biome[22]. Deforestation exposed the soil and with the dry leaves in the area recently converted into pasture, large areas of the Amazon caught fire, an amount not expected for a not so dry year.

[16] RAMMIG, Anja et al. Estimating the risk of Amazonian forest dieback. New Phytologist, v. 187, n. 3, p. 694-706, 2010.
[17] LEWIS, Simon L. Tropical forests and the changing earth system. Philosophical Transactions of the Royal Society B: Biological Sciences, v. 361, n. 1465, p. 195-210, 2006.
[18] LEWIS, Simon L. et al. The 2010 amazon drought. Science, v. 331, n. 6017, p. 554-554, 2011.
[19] JIMÉNEZ-MUÑOZ, Juan C. et al. Record-breaking warming and extreme drought in the Amazon rainforest during the course of El Niño 2015–2016.

Likelihood	The likelihood of fire in the project area is approximately annual: less than every 10 years.
Score (LS)	LS = 2 (Risk rating: 2 x 0.25 = 0.50)
Mitigation	Hiwi Operating Procedure[23] is being implemented, its goal is to reduce risks of fire and related trespassing. It involves fire brigades being organized by local labor forces. Those in favor of the objectives of the project (preservation of natural resources and the continuation of forest management) will be included in training courses. The Project budget provides for investments in purchase and equipment and fire brigades training course. All costs will be covered by the project proponent.
	M: 0.25

Scientific reports, v. 6, n. 1, p. 1-7, 2016.

[20] NOGUEIRA, Euler Melo et al. Tree height in Brazil's 'arc of deforestation': shorter trees in south and southwest Amazonia imply lower biomass. Forest Ecology and Management, v. 255, n. 7, p. 2963-2972, 2008.

[21] ARAGÃO, Luiz Eduardo OC et al. Spatial patterns and fire response of recent Amazonian droughts. Geophysical Research Letters, v. 34, n. 7, 2007.

[22] Retrospective: Increased deforestation caused the Amazon to catch fire in 2019.

[23] See Word file: "Operating_Procedure-All", made available at audit Audit PD & MR\Evidence\Operating Procedure

Natural Risk (Pest and Disease outbreaks – "PD")	
Significance	This risk is not applicable to the project area, as explained below.
Likelihood	There is no record of Pest or Disease outbreaks in the area, since the area is a natural forest in a state of equilibrium, where it is understood to have virtually zero pest or disease outbreaks. In healthy and stable forests, disturbances by insect pests and diseases are an integral part of the forest ecosystem (van Lierop et al, 2015)[24]. Regarding disease and pest outbreaks in tropical humid forests, due to the high species diversity and resilience, these ecosystems have a strong capacity to adapt and react to any specific single pathogen, insect, or pest (in general terms) that could develop cause widespread damage to vegetation, with consequent carbon loss. There is no scientific evidence of this sort of outbreak in highly diverse tropical humid forests vegetation in the Amazon, which would be different in monoculture tropical plantations. The study carried out by Van Lierop analyzed data from the FRA 2015, in which 115 countries were asked to report on specific types of pests, diseases and weather disturbances as well as on the species or forest type affected. In the study, only 3,05% of the total forest area of all regions were affected by insect pests, being that of this total, 0,039% occurred in the South American region. In addition, diseases affected a relatively small extentof forests in all geographic regions of the globe. The forests of the project area have a high diversity of tree species, with over 275 tree species >15 cm dbh[3], and like other diverse tropical forests, are not known to be subject to catastrophic disturbance by insect pests or forest diseases. Further, there is no history of catastrophic forest disturbance due to forest pests or diseases in the project region. Thus, it can be concluded that the risk of pests and diseases in the project area is practically non-existent.
Score (LS)	LS = 0 (Risk rating: 0 x 1 = 0)
Mitigation	None (1).

[24] https://www.sciencedirect.com/science/article/pii/S0378112715003369 (last visited on: 03/06/2022)

Natural Risk (Extreme Weather– "W")	
Significance	According to the IPCC Sixth Assessment Report[25], the Amazon Forest was highly impacted by the unprecedented droughts and higher temperatures observed in 1998, 2005, 2010 and 2015/2016, attributed partly to climate change. This resulted in high tree mortality rates and basin-wide reductions in forest productivity (high confidence). The combined effect of anthropogenic land use change and climate change increases the vulnerabilities of terrestrial ecosystems to extreme climate events and fires (medium confidence). The Amazon rainforest is one of the most biodiverse regions in the world, and its progressive deforestation may result in abrupt and profound changes in the regional climate and intensification of extreme climate events. Nobre et al (2009)[26]. predicted a nearly 60% rainfall reduction and a 2 °C increase in the near surface air temperature over the Amazon based on a scenario of Amazonian deforestation incorporating ocean–atmosphere coupling. According to Lewis et al. (2011)[27]: "The 2005 and 2010 droughts both coincided with higher-than-normal tropical North Atlantic Sea surface temperatures (SST), which have been linked to the 2005 Amazon drought and are suspected in the 2010 drought. The 2010 drought also coincided with a La Niña event, associated with cooler than normal sea surface temperatures in the equatorial Pacific. Hydraulic failures can treat larger trees that can eventually compromise forest biomass and productivity (Rowland *et al*., 2015)[28]. Although the above statements indicate that extreme events will be more frequent in the region, Esquivel-Muelbert *et al*. (2018)[29] showed that the Amazon biome is in fact undergoing an average drying trend (-1.1 mm/year), however, the change in the Amazonian tree flora will not occur at the same pace and will be slower, much as a function of community resilience. Therefore, we conclude this event is insignificant (less than 5% loss of carbon stocks) or transient (full recovery of lost carbon stocks expected within 10 years of any event)

[25] https://www.ipcc.ch/report/ar6/wg2/downloads/outreach/IPCC_AR6_WGII_FactSheet_CentralSouthAmerica.pdf (last visit on: 7/28/2022)
[26] Nobre, P., Malagutti, M., Urbano, D. F., Almeida, R. A. Fde & Giarolla, E. Amazon deforestation and climate change in a coupled model simulation. J. Clim. 22, 5686–5697 (2009).
[27] Lewis, S., Brando, P., Phillips, O., Heijden, G. Nepstad, D.; The Amazon Drought 2010, Science, ISSN 0036-8075 (pressed) 1095-9203 (online), Volume 331. 2011
[28] Rowland et al., 2015. Death from drought in tropical forests is triggered by hydraulics not carbon starvation. DOI: 10.1038/nature15539
[29] Esquivel-Muelbert A, Baker TR, Dexter KG, et al. Compositional response of Amazon forests to climate change. Glob Change Biol. 2018;00:1–18
All bibliography can be found in the folder "Audit PD & MR\Bibliography\NPRR"

	Therefore, the extreme events impact over the forest biomass may be considered insignificant (less than 5% loss of carbon stocks) or transient (full recovery of lost carbon stocks expected within 10 years of any event).
Likelihood	The likelihood of Extreme Weather is under every ten years, in accordance with the academic sources above.
Score (LS)	LS = 2 (Risk rating: 2 x 1 = 2)
Mitigation	None (1).

Natural Risk (Geological Risk – "G")	
Significance	Not applicable to the project area, see explanation below.
Likelihood	The level of seismic activity in Brazil is classified as low, and it has been calculated that the average recurrences are: less than 2 seismic events of over 4 mb magnitude every year, one seismic event of over 5.0 mb magnitude every six years, and one seismic event of 6.0 magnitude every 45 years. Despite the very low recurrence, seismic events of magnitudes up to 7.6 mb are possible, and in that case, their recurrence interval in Brazil is of around 885 years (LOPES et al, 2011)[30]. It can be said that it is impossible for an earthquake of magnitude greater than 8 to occur in Brazil. This type of event usually occurs at the converging boundaries of lithospheric plates, as in Japan and Chile (LOPES et al, 2011).

Richter scale of earthquake magnitude[31]

magnitude level	category	effects
less than 1.0 to 2.9	micro	generally not felt by people, though recorded on local instruments
3.0–3.9	minor	felt by many people; no damage
4.0–4.9	light	felt by all; minor breakage of objects
5.0–5.9	moderate	some damage to weak structures
6.0–6.9	strong	moderate damage in populated areas
7.0–7.9	major	serious damage over large areas; loss of life
8.0 and higher	great	severe destruction and loss of life over large areas

[30] https://www2.ifrn.edu.br/ojs/index.php/HOLOS/article/view/4703 (last visit on: 7/28/2022)
[31] https://www.britannica.com/science/earthquake-geology/Earthquake-magnitude (last visit on: 7/28/2022)

	The highest earthquake recorded in Brazil (6.6 degrees Richter) occurred in 1955 in the State of Mato Grosso, in the region of the Juará and Porto dos Gauchos municipalities (over 1,500 km from the project area), but there are no records of considerable damage caused by it (TOMINAGA et al. 2009)[32]. The risks of carbon losses related to geological phenomena are more prone to occur in steeply sloped landscapes, which is not the case in the project area (predominantly flat landscape). In steeply sloping areas, biomass loss can occur through earthquake-induced landslides. Even in these cases, previous studies (ALLEN et al. 1999)[33] show that much of an earthquake's immediate impact is low intensity damage to forests. It is also important to observe that landslides are not likely to occur within the project area because project sites are uniformly level (less than 5% slope) in these flat plain areas. Thus, the earthquake intensity and frequency in Brazil and general geologic risks are not likely to produce significant losses of forest biomass. In this context, there are strong reasons to reject the possibility of any significant vegetation damage caused by earthquakes in the project region.
Score (LS)	LS = 0 (Risk rating: 0 x 1 = 0)
Mitigation	None (1).

Score for each natural risk applicable to the project (Determined by (LS × M)	
Fire (F)	0.5
Pest and Disease Outbreaks (PD)	0.0
Extreme Weather (W)	2.0
Geological Risk (G)	0.0
Total Natural Risk (as applicable, F + PD + W + G)	2.5

[32] http://ppstma.unievangelica.edu.br/sncma/anais/anais/2013/2013_st10_005.pdf (last visit on: 7/28/2022)
[33] https://esajournals.onlinelibrary.wiley.com/doi/abs/10.1890/0012-9658(1999)080[0708:IDBAET]2.0.CO;2

4 OVERALL NON-PERMANENCE RISK RATING AND BUFFER DETERMINATION

4.1 Overall Risk Rating

Risk Category	Rating
Internal Risk	5.0
External Risk	0.0
Natural Risk	2.5
Overall Risk Rating (a + b + c)	**10**

4.2 Calculation of Total VCUs

Year	Estimated net GHG emission reductions (tCO2e)	Ex ante buffer credits (tCO2e)	GHG credits eligible to be issued as VCUS (tCO2e)
2019	7,687	772	6,915
2020	53,578	5,381	48,197
2021	63,590	6,390	57,200
2022	65,305	6,567	58,738
2023	66,583	6,700	59,883
2024	64,815	6,527	58,288
2025	69,850	7,037	62,813
2026	76,405	7,700	68,705
2027	84,418	8,510	75,908
2028	74,170	7,486	66,684
2029	80,888	8,165	72,723
2030	84,401	8,519	75,882
2031	89,178	9,000	80,178
2032	88,347	8,918	79,429
2033	89,408	9,025	80,383
2034	83,516	8,435	75,081
2035	90,144	9,101	81,042
2036	95,968	9,687	86,282
2037	87,084	8,795	78,289
2038	87,752	8,863	78,889
2039	82,978	8,384	74,594
2040	86,074	8,695	77,380
2041	96,517	9,743	86,774
2042	93,153	9,406	83,747
2043	99,987	10,092	89,895
2044	92,950	9,387	83,564
2045	97,902	9,884	88,018
2046	102,640	10,360	92,280
2047	97,139	9,809	87,330
2048	95,260	9,621	85,640
2049	107,214	10,822	96,392
Total	2,554,903	**257,779**	**2,297,124**