



**Verified Carbon
Standard**

THE ARR CERRADO CARBON PROJECT

Document Prepared by Waycarbon Soluções Ambientais e Projetos de Carbono LTDA

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The ARR Cerrado Carbon Project is located at the Cerrado Biome, in the state of Mato Grosso do Sul, Brazil. It is an AFOLU project, and therefore is classified within scope 14. More specifically, the project falls under the ARR category.

The ARR Cerrado Carbon Project's purpose is to remove and reduce GHG emissions through an increase in forestry area in the state of Mato Grosso do Sul, at the Cerrado biome, initially near the city of Ribas do Rio Pardo. The project also includes the management and implementation of various social activities at the local communities nearby. The carbon credits are a result of the change of land use in previous pasture areas, through the plantation of Eucalyptus species in an area of 38.708 ha (ARR category).

The plantation activities will be developed in accordance with good forestry practices, and in addition, the project proponents will also seek certification under sustainable programs, such as the FSC, which can confirm the implementation of such practices.

In addition, it is important to highlight that the credit's revenue will allow for an unusual restoration and enforced conservation of native vegetation on Legal Reserves (RL – Reservas legais, in Portuguese) and Permanent Protection Areas (APP – área de preservação permanente, in Portuguese), where a specific study is developed to assess the phytobiognomy of the area, which enables the implementation of more assertive actions and restoration activities, and are monitored for internal purposes, even though it is not accounted as emissions removals by the project. Although the forest code outlines that a percentage of the area must be preserved from active degradation, the landowner is not required to actively restore the area, as it is actually being implemented, and is not a common practice at the region.

This activity becomes even more important under the light of deforestation events and rates at the region. Last year (2020), the city of Ribas do Rio Pardo, where the project area is located, registered the second highest deforestation area of the state. This is even more worrisome, considering that the state also has the highest deforestation rates under the

Cerrado biome, which has been the second most impacted biome by deforestation in the country, with 33,5% of the deforested areas¹.

Under the social sphere, the project also brings benefits for the region. Although Suzano usually implements social projects in the region where it operates, either because it is a good practice (Suzano's Educational Program, Carbon Neutral Meat and Milk: Silvipastoral Suzano; Promotion Notices; Youth Movement; Good Agent and First Job), or to meet requirements to operate industrially nearby the project location (Ribas + Education; Circular Economy: Waste Recovery Unit; Public Management Support Program; + Water; Alternative Sanitation; Healthy Smile), the credits revenue will enable the development additional social activities to benefit the society surrounding the project areas, in accordance to the local communities needs and characteristics (+ Food; Carbon Neutral Meat and Milk: Food reserve bank for dairy farming; Carbon Neutral Meat and Milk: Circular Cerrado; Native Seedling Nursery; Honey Production).

In addition to removing and reducing carbon emissions, the ARR activities conducted will impact local habitat and enrich fauna and flora biodiversity, provide a safe habitat to local fauna, recover degraded areas, improve the soil condition and reduce its erosion, increase water retention and protect water resources, and improve the microclimate of the region by making local temperatures milder. Furthermore, it also reduces rural exodus through the creation of more job opportunities for local community in areas of economical vulnerability, improve life quality and reduce forest degradation and deforestation in the region.

The areas are distributed in a mosaic configuration, located at private properties, and are owned or leased by Suzano.

The project activities will begin on the 19-07-2019 with soil preparation activities. This is the start date of the project, which will have a renewable crediting period of 100 years, from 19-07-2019 to 18-07-2119, with an average annual GHG emission of 75,984 tCO₂e.

¹ MapBiomas, 2021. Relatório anual do desmatamento no Brasil - 2020. Available at: <https://s3.amazonaws.com/alerta.mapbiomas.org/rad2020/RAD2020_MapBiomasAlerta_FINAL.pdf>. Last access on 25 November 2021.

1.2 Sectoral Scope and Project Type

The sectoral scope applied to the ARR Cerrado Carbon Project is scope 14 - Afforestation, Forestation and Other Land Use (AFOLU), specifically under the Afforestation, Reforestation and Revegetation (ARR). This is not a multiple activity project. This is a grouped project.

1.3 Project Eligibility

The ARR Cerrado Carbon Project meets all the eligibility criteria and requirements set by the VCS Program for the AFOLU sectorial scope. The project includes areas subject to the afforestation, reforestation and revegetation (ARR) category.

- The project falls under the Afforestation, Reforestation and Revegetation category;
- The project is not located in REDD + program zones. So far, Brazil has REDD+ program zones in the Amazon biome, and a REDD+ program for the Cerrado biome, located in another state, Mato Grosso;
- The project area, where the plantation of trees will be implemented, is currently identified as degraded pasture and was not cleared of native ecosystems for the development of the project activity. In fact, 393 ha (at Lageado and FSW farms) were excluded from the project area because deforestation activities were identified in the last 10 years. Although this deforestation occurred before Suzano's acquisition, and this represents around 1% of the project area, such areas were removed from the project to guarantee that all requirements by VCS are met, and that no carbon credit will be generated in areas of recent deforestation. Hence, there has not been a change in land use in the project activity area within the last 10 years prior to the project start date. Images below show the project activity areas 10 years before the project start date.



Figure 1 – Map evidencing conversion of lands from forest to pasture in the 10 years preceding the project activity.

As aforementioned, before the implementation of the project, its area was characterized as degraded pasture. In addition, Suzano assumed a No Deforestation Policy, where it “reinforces its commitment to establish its plantations in areas previously anthropized by other uses, whose conversion has not occurred under its direct or indirect responsibility”². Annual reports³ are provided to guarantee transparency to the commitment and updates on the agenda. Therefore, the project activity does not drain native ecosystems.

- For the project development, there has not been nor will occur the degradation of any hydrological functions. In addition to restrictive laws, where a Permanent Preservation Area (APP) is created in the presence of water, there are no water courses within the project areas where commercial plantation will be implemented. Thus, the region and biome where the project area is located are not categorized as wet land areas and no draining activities will be conducted. The image below shows the water courses at the project region and APPs, where no project activity will be implemented.

Moreover, it is important to highlight how Suzano is concerned about water resources where it operates. There is a dedicated process to assess and analyze hydrological conditions, where monthly and annual reports are structured to control the ecosystems where operations occur. This procedure is based on qualitative and quantitative data measured on site to identify water quality, flow rate and rainfall.

² Suzano’s No Degradation Policy. Available at: <<https://storage.googleapis.com/stateless-site-suzano-en/2020/08/a6f0cae8-wood-supply-policy.pdf>>. Last access on 10 December 2020.

³ Zero Deforestation Annual Report, Suzano, 2020. Available at: <<https://storage.googleapis.com/stateless-site-suzano-en/2020/10/bd710250-relato%CC%81rio-anual-de-desmatamento-zero-suzano-2020-contribuic%CC%A7o%CC%83es-ym-green-en-us.pdf>>. Last access on 10 December 2020.

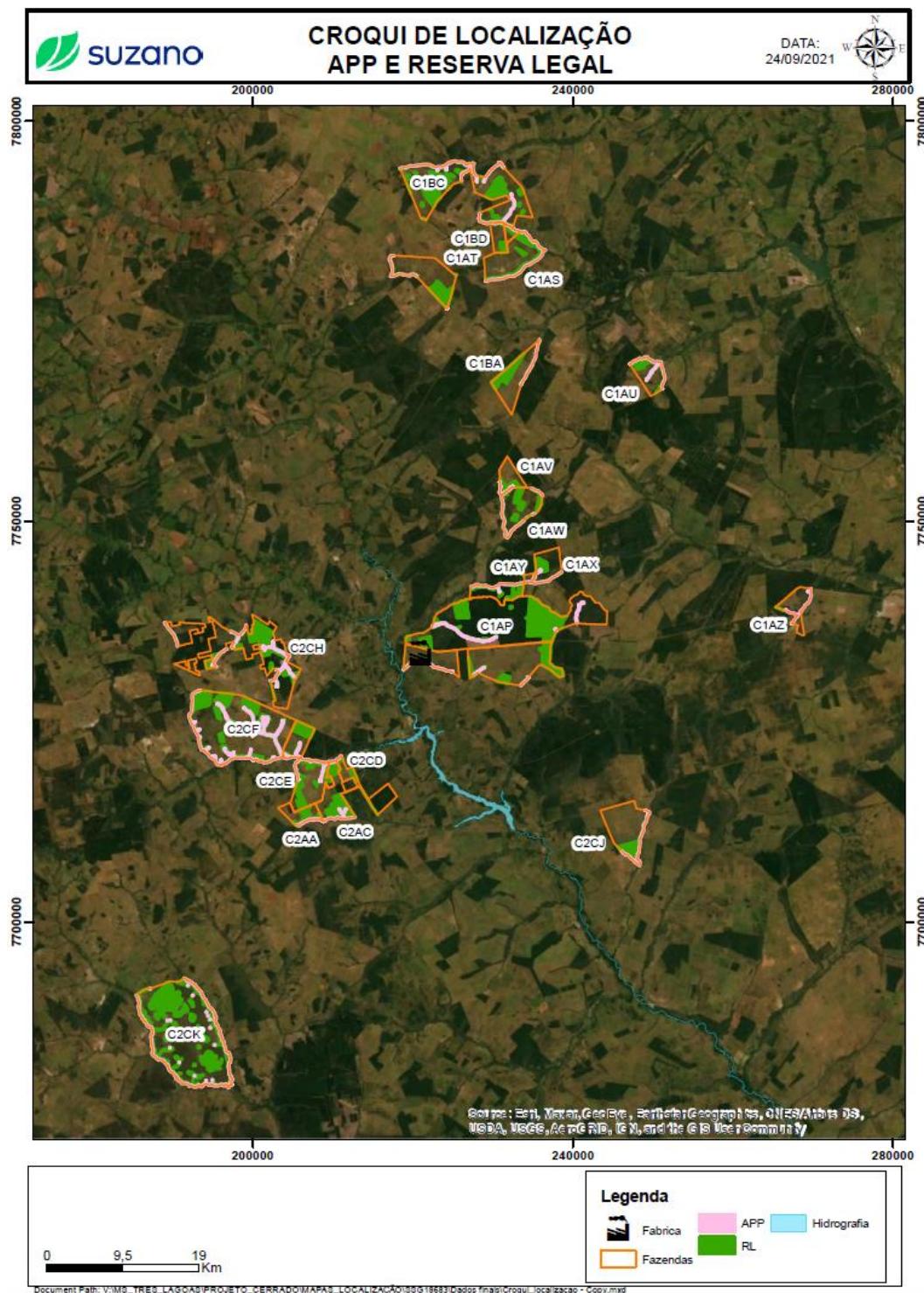


Figure 2 - Map with the location of water courses, permanent protection areas and legal reserves nearby or inside project areas.

1.4 Project Design

The project consists of the commercial plantation of species from the *Eucalyptus* spp gender. So far, the farms that already started commercial planting implemented the *E. urophylla* S.T. Blake (6 clones), and two hybrids *E. grandis* Hill ex Maiden with *E. urophylla* S.T. Blake.

The *E. urophylla* is an Indonesian species, mainly from the Timor and Flores islands. This species can adapt to a wide range of altitudes, from sea level to 3,000m altitude levels, and is known by its important characteristics, such as the tolerance to water stress, resistance to plagues and capacity of rooting.

On the other hand, the *E. grandis* originally from the Australian coastlands, from the New South Wales and Queensland states. This species has good properties for cellulose pulping and is known by its vigorous growth.

The hybrid of the two species is widely used by the forestry sector given its productive capacity and combination of important characteristics.

Brazil has the largest ex-situ collection of eucalyptus germplasm in the world. The species has enabled a significant increase in the quantitative and qualitative productivity of planted forests in its territory.⁴ The prominence of the eucalyptus culture is related to the gains obtained by the advancement of genetic improvement and the improvement of forest management practices.⁵

The species planted in Project Cerrado present volumetric productivity between 30 and 35 m³/ha.year (average annual increment), which can vary according to the pluviometry regimen, type of soil and management.

It is important to stress that the project proponents only allow the plantation of *Eucalyptus*, and there is a list of permitted species under this gender that can be used in order to assure the intensity of wood production and carbon captured.

Initially, the project consists of a total area of 67,202.35 ha, distributed in 19 areas owned by Suzano, located nearby Ribas do Rio Pardo, in the State of Mato Grosso do Sul.

⁴ PINTO JÚNIOR, J. E. P.; SANTOS, P. E. T.; AGUIAR, A. V.; KALIL-FILHO, A. A.; PIRES, I. E.; RESENDE, M. D. V.; SILVA, R. L.; RESENDE JÚNIOR., M. R. R. Genética florestal. Viçosa-MG: Arka, 2011. 318 p

⁵ CASTRO, C. A. O.; RESENDE, R. T.; BHERING, L. L.; CRUZ, C. D. Brief history of *Eucalyptus* breeding in Brazil under perspective of biometric advances. Ciência Rural, Santa Maria, v. 46, n. 9, p.1585-1593, 2016.

The project is not a Multiple Activity project, it is a Grouped Project.

1.4.1 *Eligibility Criteria*

Provided this is a grouped project, new areas to be included at the project must follow a set of eligibility criteria:

- Land owned or leased by Suzano;
- For commercial plantation activity, new areas must be certified or seek certification under a recognized and high-level market sustainability program, for example the FSC at the time of the registration of this PD;
- Located at the Cerrado biome, state of Mato Grosso do Sul, highlighted by the map under the green dot area:

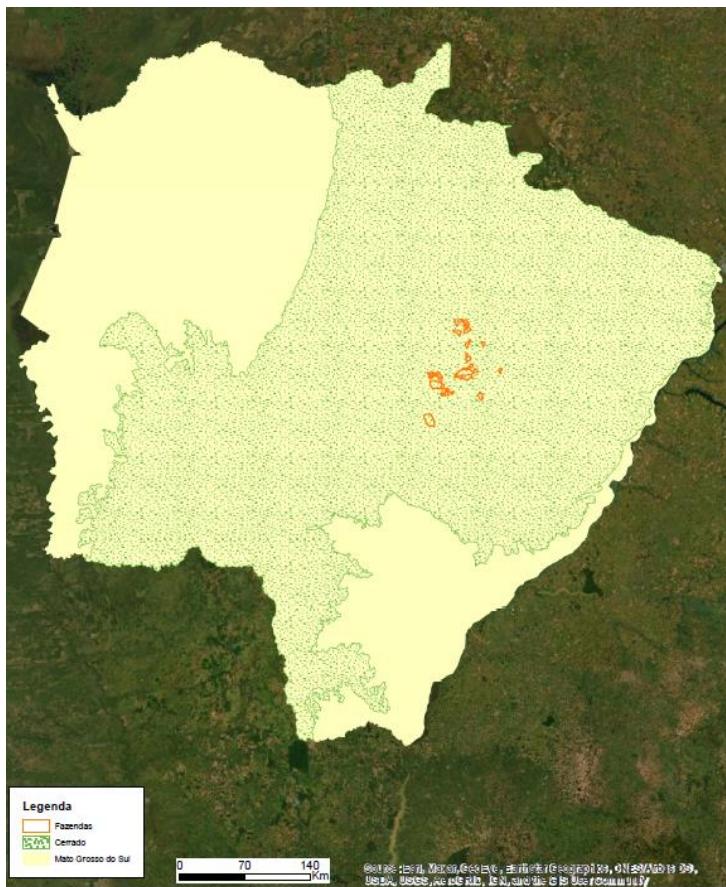


Figure 3 – New instances eligibility area

- New areas must meet the applicability conditions set out in the methodology and relevant tools applied to the project;

- New areas must prove some characteristics in common under the additionality assessment according to the rationale applied in the project description:
 - Present at least the cattle ranching alternative land use scenario, in addition to the scenario of the project without generating credits;
 - Be additional under a new barrier analysis assessment;
 - Actively restore and maintain native vegetation at RL and APP areas, and financially support the implementation of social activities developed by the grouped project, in addition to the social programs usually conducted and those required for the operation of the industry being built nearby the project location.
- New areas must be subject to the same baseline scenario as the determined by the project description;
- The pre-existing land use of the grouped project instance area must be degraded pasture.

1.5 Project Proponent

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Title	Carbon Initiatives Executive Manager
Address	Brigadeiro Faria Lima Avenue, 1355. CEP 01452-919. São Paulo, SP. Brazil
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Organization name	WAYCARBON SOLUÇÕES AMBIENTAIS E PROJETOS DE CARBONO LTDA
Contact person	Felipe Bittencourt

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1.6 Other Entities Involved in the Project

This section will be completed for the VVB assessment and project registration

1.7 Ownership

The project activity will initially be conducted in 19 areas, owned or leased by Suzano S.A.. Therefore, Suzano is the project owner and one of the project proponents, where the property deeds are listed for each property below, with the respective ID code indicated before the farm name:

Table 1 – Farm ID code, name, property deed, information and location

ID code	Farm Name	Property deed	Date	Location
C1AP	Boi Preto	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book 118 - FLS.210/220	20/09/2019	Ribas do Rio Pardo, Mato Grosso do Sul
C1AS	Guarani (I)	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book # 115 - FLS.188/194	26/03/2019	Ribas do Rio Pardo, Mato Grosso do Sul
C1AT	Granol - Modelo I	PUBLIC WRITING OF PURCHASE AND SALE, registered in the	22/02/2019	Ribas do Rio Pardo, Mato

		Quarto Serviço Notarial e Registral de Títulos e Documentos, book 115 - FLS.73/78		Grosso do Sul
C1AU	Retiro Belo Horizonte	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Quarto Serviço Notarial e Registral de Títulos e Documentos, book 115 - FLS.169/177	21/03/2019	Ribas do Rio Pardo, Mato Grosso do Sul
C1AV	Aurora (I)	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book 115 - FLS.114/115/116/117	07/03/2019	Ribas do Rio Pardo, Mato Grosso do Sul
C1AW	Rainha da Paz (I)	Real Estate Registry - 1st Registration Service and Notary Public of Protest County of Ribas do Rio Pardo MS, Book No. 2 General Register/ Matriculation 20259, Sheet 07 (back), March 27, 2017, R. 03/10259: PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book 110 - FLS.165/176	19/06/2018	Ribas do Rio Pardo, Mato Grosso do Sul
C1AX	Lageado (I)	Property Registry - 1st Registration Service and Notary Public of Protest County of Ribas do Rio Pardo MS, Book No. 2 General Register / Registration 19261, Sheet 04 (back), October	05/04/2018	Ribas do Rio Pardo, Mato Grosso do Sul

		21, 2015, R. 07/19361: PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book 109 - FLS.048/054		
C1AY	Bom Pastor (I)	Property Registry - 1st Registration Service and Notary Public of Protest County of Ribas do Rio Pardo MS, Book No. 2 General Register / Matriculation 20576, Sheet 03 (back), March 20, 2018, R. 02/20576: PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book 109 - FLS.55/66	05/04/2018	Ribas do Rio Pardo, Mato Grosso do Sul
C1AZ	Lagoa Comprida (I)	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book 114 - FLS.131/140	21/01/2019	Ribas do Rio Pardo, Mato Grosso do Sul
C1BA	Campo Limpo (I)	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book 114 - FLS.141/146	29/01/2019	Ribas do Rio Pardo, Mato Grosso do Sul
C1BC	Pena Roja (I)	Real Estate Registry - 1º Serviço Registral e Tabelionato de Protesto Comarca de Ribas do Rio Pardo MS, Book nº 2 Registro geral/ Matrícula 19340, Ficha 13, September 28, 2015, R.	28/09/2015	Ribas do Rio Pardo, Mato Grosso do Sul

		07/19340: ESCRITURA PÚBLICA DE COMPRAR A E VALE, registered in the Quarto Serviço Notarial e Registral de Títulos e Documentos, book 109 - FLS.55/66		
C1BD	Laluvi (I)	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book 116 - FLS.253/258	27/06/2019	Ribas do Rio Pardo, Mato Grosso do Sul
C2AA	INEC (II)	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book 116 - FLS.033/036	13/05/2019	Ribas do Rio Pardo, Mato Grosso do Sul
C2AC	FSW (I)	1st Registration Service and Notary Public of Protest County of Ribas do Rio Pardo MS, Book No. 2 General Register/ Matriculation 21406, Sheet 10 (back), October 22, 2019, R. 09/21406: PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book 116 - FLS.200/212	12/06/2018	Ribas do Rio Pardo, Mato Grosso do Sul
C2CD	Andramil I (I)	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registral Service of Titles and Documents, book 114 - FLS.180/184	06/02/2019	Ribas do Rio Pardo, Mato Grosso do Sul
C2CE	Andramil II (I)	Real Estate Registry - 1st Registration Service and Notary	06/02/2019	Ribas do Rio Pardo, Mato Grosso do Sul

		Public of Protest County of Ribas do Rio Pardo MS, Book No. 2 General Register/ Matriculation 15785, Record 05, JUNE 10, 2009, R. 07/15785: PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book 114 - FLS.180/184		Grosso do Sul
C2CF	Cassununga (I)	Real Estate Registry - 1st Registration Service and Notary Public of Protest County of Ribas do Rio Pardo MS, Book No. 2 General Register/ Matriculation 21245, Page 05, December 04, 2018, R. 04/21245: PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book 126 - FLS.01/08	02/06/2021	Ribas do Rio Pardo, Mato Grosso do Sul
C2CJ	Santa Luzia (I)	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registration Service of Titles and Documents, book 116 - FLS.200/213	12/06/2019	Ribas do Rio Pardo, Mato Grosso do Sul
C2CK	Ponte Alta (I)	PUBLIC WRITING OF PURCHASE AND SALE, registered in the Fourth Notarial and Registral Service of Titles and Documents, book 116 - FLS.167/199	12/06/2019	Ribas do Rio Pardo, Mato Grosso do Sul

1.8 Project Start Date

According to the VCS Standard Version 4.2 section 3.7, the project start date for AFOLU projects is the date on which activities, that lead to the generation of GHG emission reductions or removals, are implemented. Therefore, the project start date is defined as 19 July 2019, the date when activities for preparing land for seedling were implemented at the first PU, at Boi Preto Farm, according to internal documentation.

1.9 Project Crediting Period

The Project Crediting Period will be 100 years, fixed.

The first crediting period will be from 19 July 2019 to 18 July 2119, both days included.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	Yes
Large project	No

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
1	-41,571,61
2	4,676.76
3	82,740.76
4	501,690.30
5	1,833,743.04
6	1,819,629.21
7	1,808,104.54

8	1,797,329.75
9	1,098,524.32
10	964,257.49
11	-1,438,387.99
12	-3,826,762.30
13	818,357.09
14	1,389,102.97
15	1,550,626.61
16	935,783.78
17	846,119.09
18	-1,465,469.66
19	-3,749,956.27
20	814,029.85
21	1,353,242.59
22	1,512,054.61
23	900,932.35
24	815,636.16
25	-1,491,706.00
26	-3,773,472.58
27	792,541.36
28	1,336,355.47
29	1,498,046.62
30	889,113.51



31	805,628.21
32	-1,500,199.67
33	-3,780,635.53
34	786,519.30
35	1,331,158.67
36	1,493,609.77
37	885,337.24
38	802,416.33
39	-1,502,930.40
40	-3,782,959.53
41	784,540.65
42	1,329,481.24
43	1,492,185.07
44	884,126.52
45	801,387.33
46	-1,503,805.02
47	-3,783,702.80
48	783,909.04
49	1,328,944.12
50	1,491,728.45
51	883,738.38
52	801,057.40
53	-1,504,085.46



54	-3,783,941.18
55	783,706.41
56	1,328,771.90
57	1,491,582.07
58	883,613.96
59	800,951.64
60	-1,504,175.35
61	-3,784,017.60
62	783,641.45
63	1,328,716.69
64	1,491,535.14
65	883,574.07
66	800,917.73
67	-1,504,204.17
68	-3,784,042.09
69	783,620.63
70	1,328,698.99
71	1,491,520.09
72	883,561.28
73	800,906.86
74	-1,504,213.41
75	-3,784,049.95
76	783,613.96

77	1,328,693.32
78	1,491,515.27
79	883,557.18
80	800,903.38
81	-1,504,216.37
82	-3,784,052.46
83	783,611.82
84	1,328,691.50
85	1,491,513.72
86	883,555.87
87	800,902.26
88	-1,504,217.32
89	-3,784,053.27
90	783,611.13
91	1,328,690.91
92	1,491,513.23
93	883,555.44
94	800,901.91
95	-1,504,217.63
96	-3,784,053.53
97	783,610.91
98	1,328,690.73
99	1,491,513.07

100	883,555.31
Total estimated ERs	9,606,826.60
Total number of crediting years	100
Average annual ERs	96,068

Considered this is an ARR project with rotational activities, there is a limit that must be observed which defines the quantity of estimated ERs that can be converted to actual VCUS, The Long-term average GHG benefit. Project proponents considered the long-term average GHG benefit, as required by VCS Standard. Project LTA was estimated as: 7,598,476.

$$LA = \frac{\sum_{t=0}^n PE_t - BE_t}{n}$$

Where:

LA = The Long-Term Average GHG benefit

PE_t = The total to-date GHG emission reductions and removals generated in the project scenario (tCO2e). Project scenario emissions reduction and removals shall also consider project emissions of CO2, N2O, CH4 and leakage.

BE_t = The total to-date GHG emissions reductions and removals projected for the baseline scenario (tCO2e)

T = year

N = total number of years in the established time period.

The LTA estimation does not exclude yet the number of credits that must be directed to the pooled buffer account. Emission Reduction estimations section is still under development.

1.11 Description of the Project Activity

The ARR Cerrado Carbon Project activity aims to recover and guarantee the reforestation of degraded areas through the plantation of Eucalyptus. It will also enhance native vegetation through the assisted regeneration of native species on degraded APP and RL areas and protect native vegetation in the project area from unplanned deforestation, besides the social projects to be implemented, although these activities do not count for carbon reductions and removals.

Through the natural process of photosynthesis, trees absorb carbon from the atmosphere and store it in their biomass, a phenomenon also known as carbon sequestration. In this process, the trees absorb the molecules of CO₂ and water which, in the presence of light, results in the production of glucose (C₆H₁₂O₆) and water, releasing oxygen (O₂) to the atmosphere. The glucose goes through several chemical reactions during the metabolic process, resulting in the production of biomass. Approximately 47% of a tree's biomass is carbon⁶.

Forests have an important role in preserving characteristics of a certain region. They improve the microclimate of the regions, making local temperatures milder, reducing erosion, maintaining biodiversity, protecting water resources, and finally reducing other negative impacts that climate change could cause. Also, planted forests increases the availability of wood and fiber supply for industrial consumption, reducing the pressure on native forests.

As pointed out in section 1.3, the project is not located within a jurisdiction covered by a jurisdictional REDD+ program.

Process of implementation and management of the plantation areas

The forest implementation process is composed of a set of silvicultural activities, precisely designed to obtain a safe environment and technical conditions for the development of a planted forest. The project activity's procedures follow a specific protocol, whose ID is P0.12.02.001, developed by Suzano.

The procedure starts with the silviculture team, where supervisors and technicians receive the micro-planning map of the area, with information about the location, conditions and the activities to be performed.

During the execution of the silvicultural implantation activities, the teams must follow the micro planning information, which defines the execution area for planting Eucalyptus and delimits the areas that will be conserved and remain in permanent preservation.

The forest implantation process is developed in sequential steps, as follows

1. Cleaning of the area: The activity is implemented in a way that may facilitate the execution of subsequent silvicultural activities. The process is implemented in the project area as informed to the environmental agency. Eventually, chemical cleaning can be applied, depending on the characteristics of the area. The recommended

⁶ SOARES, C. P. B.; PAULA NETO, F.; SOUZA, A.L. Dendrometria e inventário florestal. 2ed. Viçosa, MG: Editora UFV, 2011. 272p.

dosage is defined by experts and varies according to the degree of infestation of invasive species.

It is important to highlight that the project area's location has a high number of occurrence of weeds, which compete with the trees for water, light and nutrients, and is also vulnerable to plagues that can damage the leaves and lead to the death of great extensions of adult forests. Under this context, weeds and pests control is essential for the maintenance of the planted trees. However, the edaphoclimatic context also promotes a higher and quicker degradation of defensives when compared to temperate climate regions.

In order to mitigate and address all environmental risks that may occur, the project activities follows all the Brazilian laws regarding the application of such products, applying only registered products allowed by the agriculture, environmental and sanitary authorities; meets all the procedures and criteria listed by the chemical politics from the applied certifications (FSC and CERFLOR); has specific internal procedures to the appliance of such products, seeking safety; supports research institutes and companies that develop more sustainable products from the environmental perspective; apply such defensives only with a previous basement on monitored data, where it is evaluated the environmental impact; the chemical defensives are applied only as a last resource; drones and other equipment for spraying products are only used at the project areas, and mainly for the application of fertilizers and biological products. Fungicides are rarely applied.

2. Ant control: This activity can occur throughout the entire cycle of the eucalyptus crop, including the cleaning step. It begins with the systematical granulated bait or micro bait holders. Whenever active scouts are found, they must be fought in a localized manner. Interventions shall be made until the pest is under control or until it does not pose a risk to the establishment of the eucalyptus crop. Depending on the climatic conditions (humidity), powdered product and/or thermal spraying may also be used under the circumstances, conditions and procedures aforementioned.
3. Soil preparation: this activity precedes planting, and its purpose is to make sure that the soil is in perfect conditions for seedling development and maintenance of forest productivity. The execution of this step must be based on the concepts of minimum cultivation, using the fewer operations as possible (restricted to the rows or the planting holes), to assure a balance between quality of soil preparation and maintenance of forest residues on the soil. The activity is carried out by agricultural tractors using subsoilers, which have a precision system that controls the execution

of the step, following the recommendations and specifications outlined in the micro planning.

It is important to highlight that Suzano thrives to implement best practices available at the market, in line with FSC and other quality standards. The subsoiling procedure is the only step that can cause disturbance to the soil, where a stem is used. The soil preparation is based on the principle for minimum cultivation, where soil disturbance is as minimal as possible, maintaining all plant residues as coverage.

In addition, Suzano has specific additional procedures to soil preparation in line with the biome of the region, where stumps can be cut and kept at the project site instead of being removed. Moreover, the process is monitored and controlled, included the depth of subsoiling activities and spacing between planting lines.



Figure 4 – Soil preparation with a subsoiler.

4. **Fertilization:** Set of activities that supply the micro and macro nutrients needed by the plant, enabling the ideal conditions for its development according to the technical recommendation specified in the forestry micro planning. Fertilization can be performed manually or with help of machines (through land or air). In the manual activity, a manual device for dosing the fertilizer is used, whereas in the mechanized activity, a device can be coupled to the subsoiler during soil preparation, or a drone can be used.
5. **Planting:** The seedlings destined for planting can be treated with termite prevention, according to specific technical recommendations for the implantation area. The seedling is then placed in the soil previously prepared, up to a specific height where it can stand still at a right angle to the ground. The soil surrounding the seedling is then pressed, to assure its fixation. In some cases, gel can be used during the

planting process, where it is added in the soil surrounding the seedling, making it unnecessary to press the soil as previously described.

For this step, the ideal climate and soil conditions must be evaluated to define which procedure must be followed: manual, semi-mechanized or mechanized planting, ensuring optimum seedling development in the field.



Figure 5 – Planted and Irrigated seedling

6. Irrigation: the purpose of this step is to ensure soil moisture and provide the ideal conditions for the plant's development in cases where the soil presents water deficit. The evaluation of the lack of soil moisture is done visually by the silvicultural team and by the assessment of meteorological data, such as precipitation, relative humidity and temperature. The wilting aspect of the seedling is also taken into consideration. Irrigation can be performed through watertight valves in a mechanized system, or manually using costals to transport the necessary amount of water to be applied per pit. To improve the effectiveness of irrigation, gel can be used at the planting activity with a dose between 1.5 to 2.0 g/seedling of absorbent polymers (gel) and irrigation. An evaluation must be made within 2 to 5 days after the first irrigation to assess the adaptation of the seedlings and to define if another irrigation is necessary. In case irrigation is necessary, the company fulfills all legal requirements before starting the operation.

All operational processes involved in the plantation procedure are submitted to auditing.

Forest maintenance and management process

It is up to the Planning team to annually prepare the schedule of plantation units (PUs) to be monitored, proceed with the installation of plots and data collection, ensure data

consistency and prepare the preliminary report of the monitoring results. This information will be used to make decisions regarding management recommendations/changes to the PUs.

The activities for forest maintenance are listed below:

1. Ant control: previously described under item 2;
2. Weeding: consists in the removal of all the invasive vegetation from the area surrounding the trees, with appropriate tools.



Figure 6 – Manual weeding

Depending on the local characteristics and technical recommendations, the weeding can also be treated with the use of herbicides, avoiding them to grow with pre-emergent, or eradicating it once it has germinated with conventional/ pressurized or semi-mechanized knapsack sprayers. Mechanized chemical weeding can also be used, which is performed with spraying equipment coupled to tractors.

The method to be applied must be defined according to the location of the area and its topography, vegetation and climate conditions.

3. Complementary Fertilization: Fertilization can be performed manually or with help of machines (through land or air). In the manual process the fertilizer is applied close to the seedling using a hose connected to the sprayer or metering cup. In mechanized fertilization, the activity must be performed with a fertilizer spreader coupled to the tractor (figure 5). The tractor is equipped with precision management equipment and should be calibrated twice a day following the dosage recommended by experts. In mechanized fertilization it is not allowed to use wet or stoned fertilizer because it may

compromise the quality of fertilization. In areal application, the aircrafts have integrated GPS that dimension application by strip, making it possible to apply fertilizer in the whole PU. Soil correction (lime, gypsum, lime mud or inorganic compost) is done by tamping machines as per Figure 7.



Figure 7 – Mechanical Fertilization



Figure 8 – Application of soil correction

4. **Brush clearing:** this activity targets controlling weeds that are in competition with the eucalyptus in the planting line through appropriate tools such as hoes and scythes. In the pre-cutting phase, the activity is carried out before harvesting begins.



Figure 9 – Mechanical pre-cut trimming

1.12 Project Location

The ARR Cerrado Carbon Project is situated in Ribas do Rio Pardo, east of Mato Grosso do Sul state. The municipality's area is 17,308.81 km², representing 4.85% of the State area. The project boundary is close to the municipal border with Santa Rita do Pardo at 4km by south, Brasilândia at 5km by southeast, and with Água Clara at 20km by east.

The main access to the project area is from BR262, that connects the Ribas do Rio Pardo city to Campo Grande, at 92km away. Ribas do Rio Pardo has a small airport to small aircraft with a 4.000m runway.

The designated areas and land occupation at the farms where the projects will be implemented are detailed below.

- Project area: 38,314.88 ha (57,1%)

Degraded pasture areas, designated to the current Project activity, where ARR activities will be accounted under the emission removals calculations. Emission removals can be monitored and accounted for this area in specific because the project proponents have set clear limits on where the project activity will take place. Project area is highlighted in light green on the maps below.

- Permanent Preservation Areas and legal Reserves (APP and RL): 15,306.34 ha (23%)

As defined per law n. 12,651/2012, the Permanent Preservation area can be covered or not by native vegetation, and has the purpose to preserve hydrological resources, landscape,

geological stability and biodiversity, protecting the soil and assuring the wellbeing of communities. Project proponents will help recovering the area, although this will not be considered under the emission reductions calculations.

The same regulation outlines that every rural property must maintain an area with vegetation coverage, as a legal reservation. It is an area located inside the rural property or possessed by the same owner, with the purpose to grant the sustainable and economical use of natural resources, helping on conservation, ecological process rehabilitation, as well as promoting the biodiversity's conservation, wildlife protection and native flora.

These areas can be identified in dark green and blue on the maps below.

- Planted areas: 46,713.86 ha (69.5 %)

Areas that were Eucalyptus plantation before the beginning of the Project. These areas are not being considered under this Project.

These areas can be identified in pink and orange on the maps below.

- Infrastructure: 5,096.14 ha (7,5 %)

Farm areas occupied with infrastructure, such as roads and hearquarters.

A KML file is attached separately to better indicate the coordinates of the project, and images of each area can be seen below.

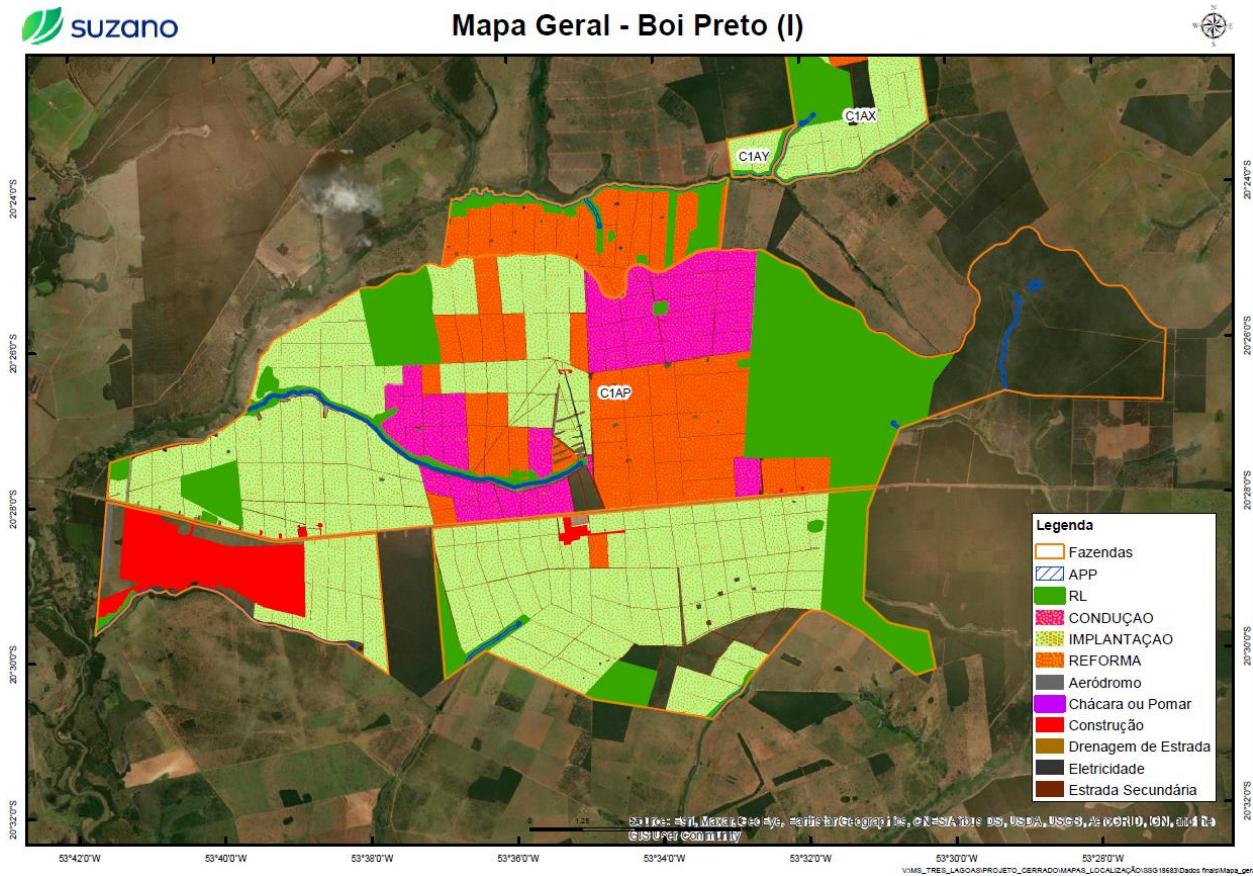


Figure 10 – Location and stratification of Boi Preto (I). Project areas highlighted in light green.

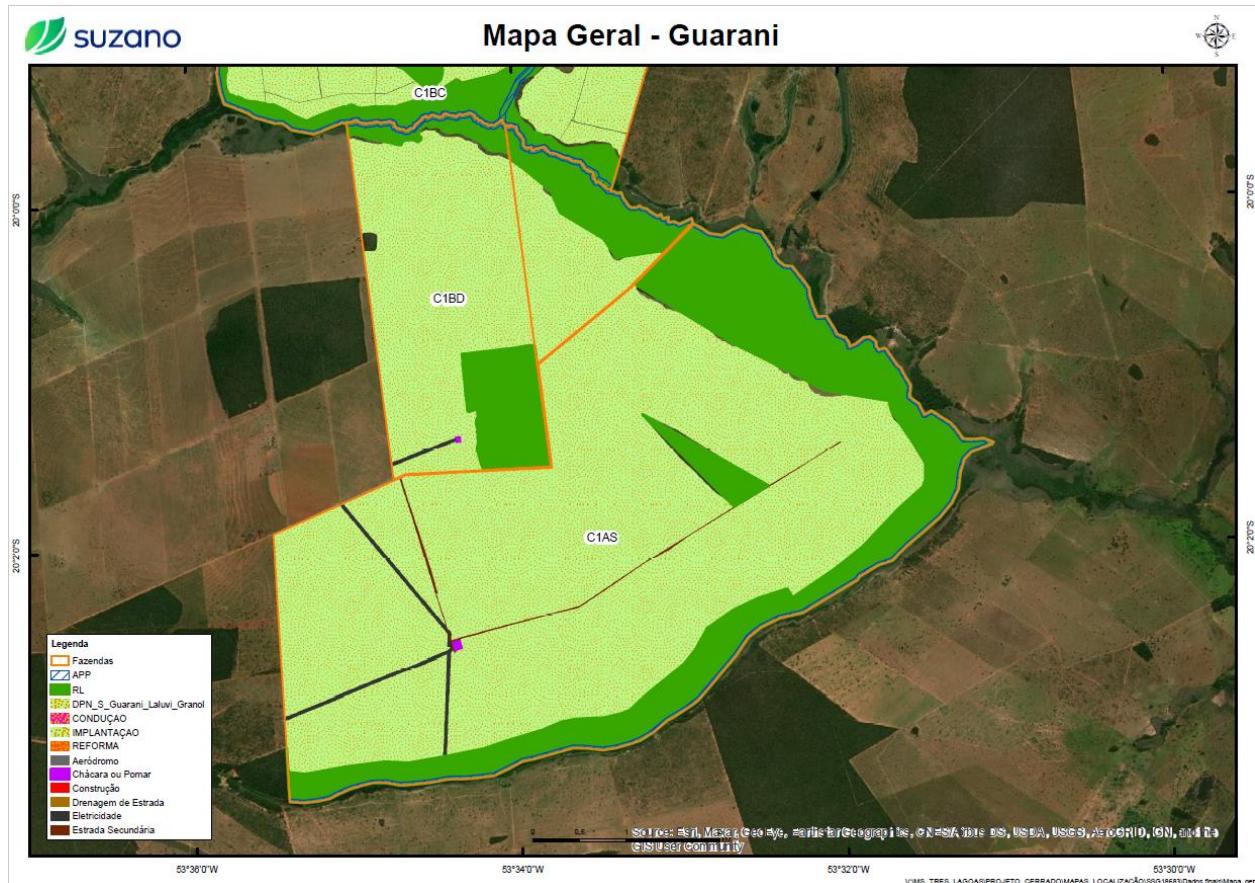


Figure 11 – Location and stratification of Guarani Farm (I). Project areas highlighted in light green.

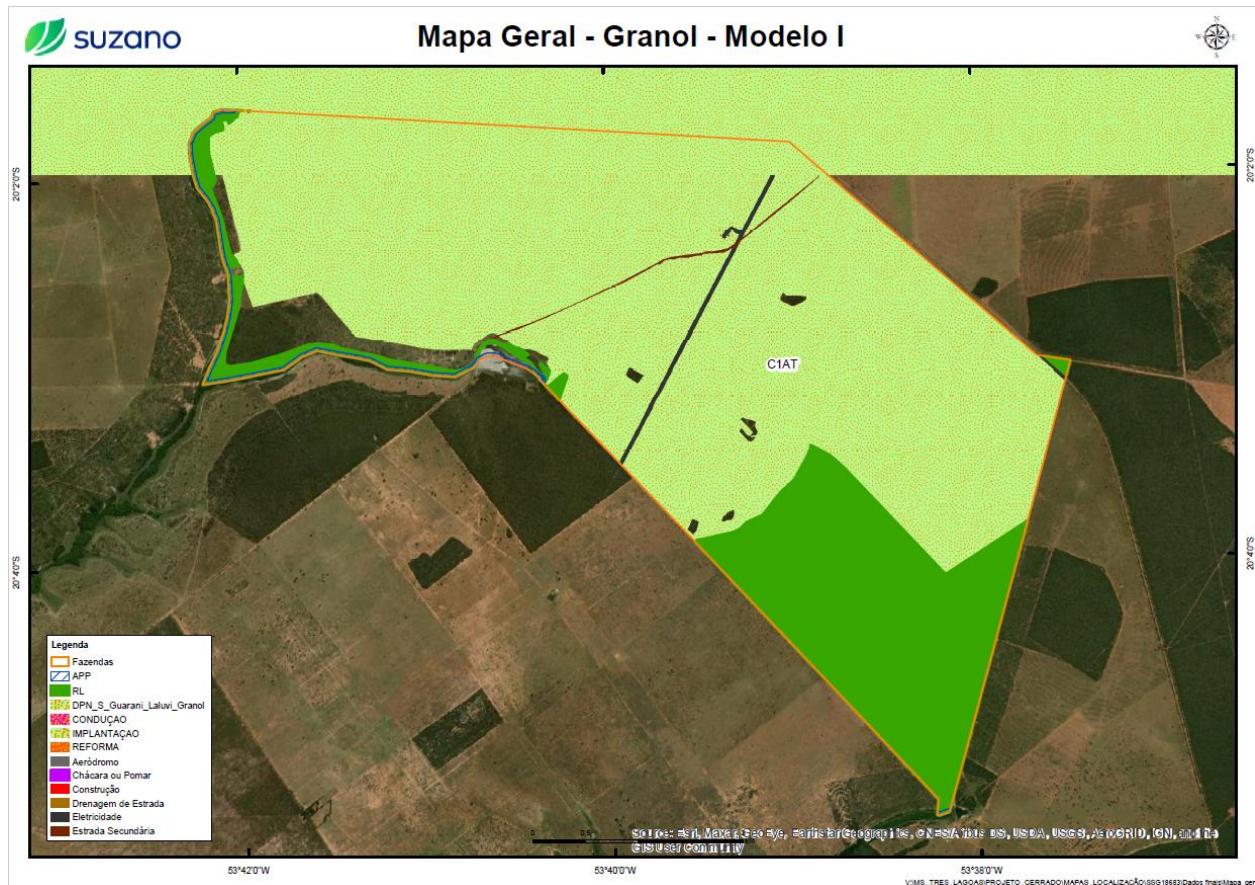


Figure 12 – Location and stratification of Granol Farm (I). Project areas highlighted in light green.

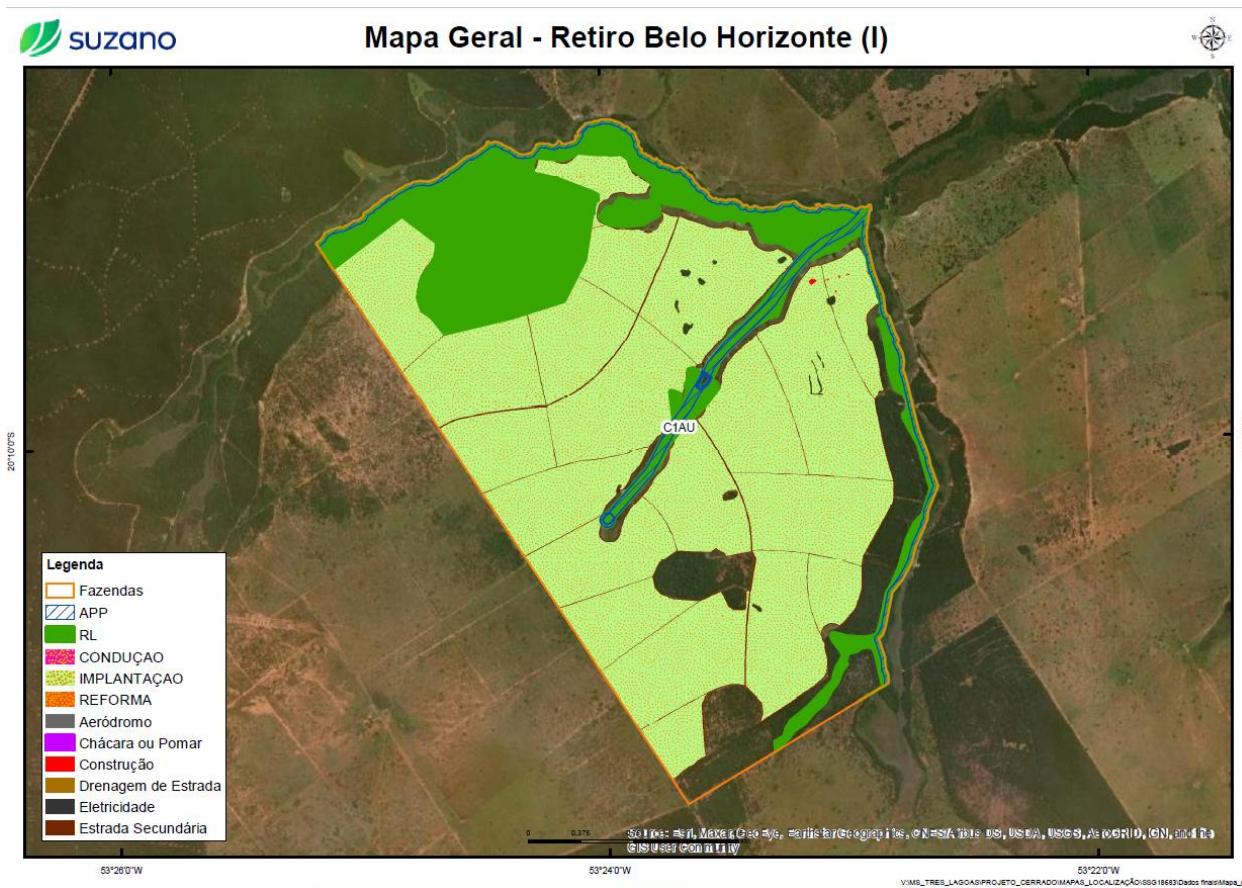


Figure 13 – Location and Stratification of Retiro Belo Horizonte (I). Project areas highlighted in light green.

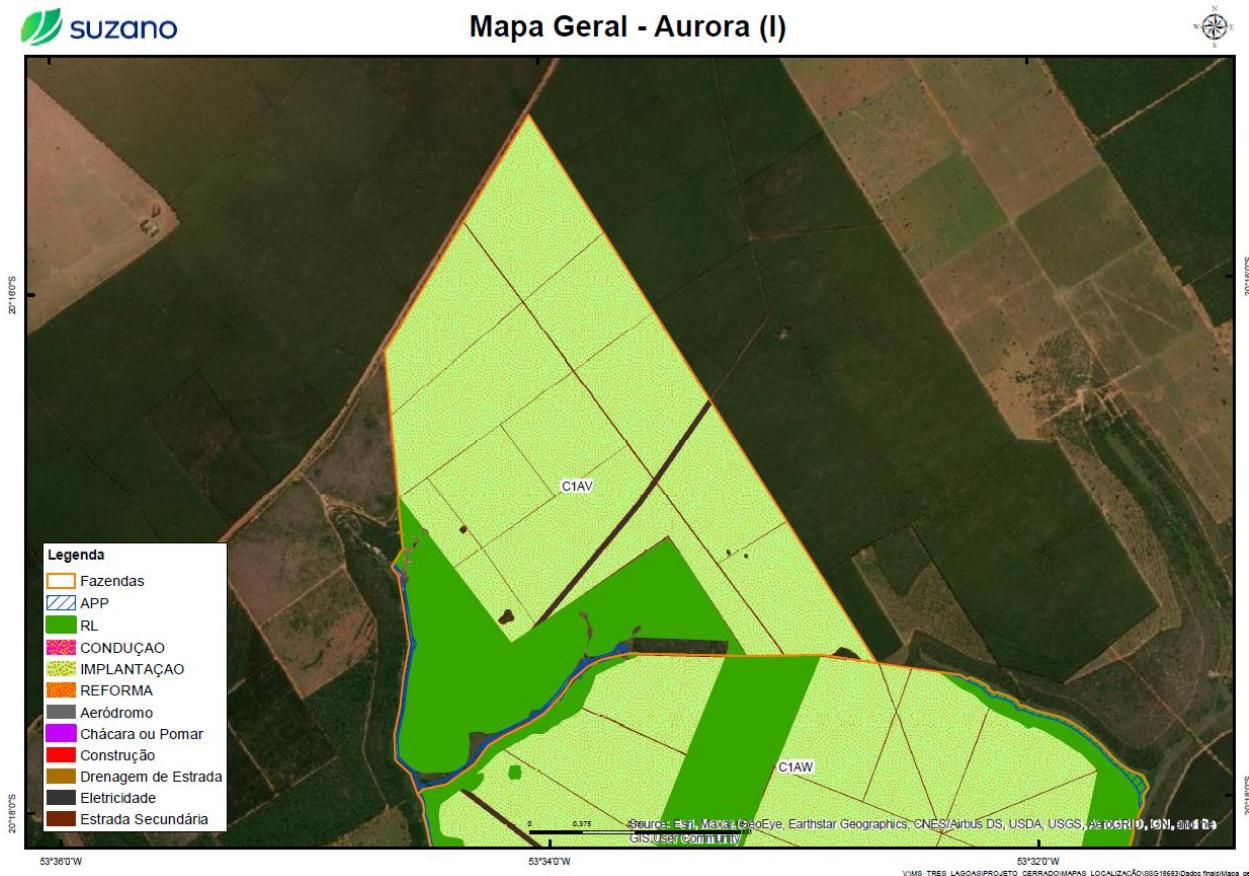


Figure 14 - Location and Stratification of Aurora (I). Project areas highlighted in light green.

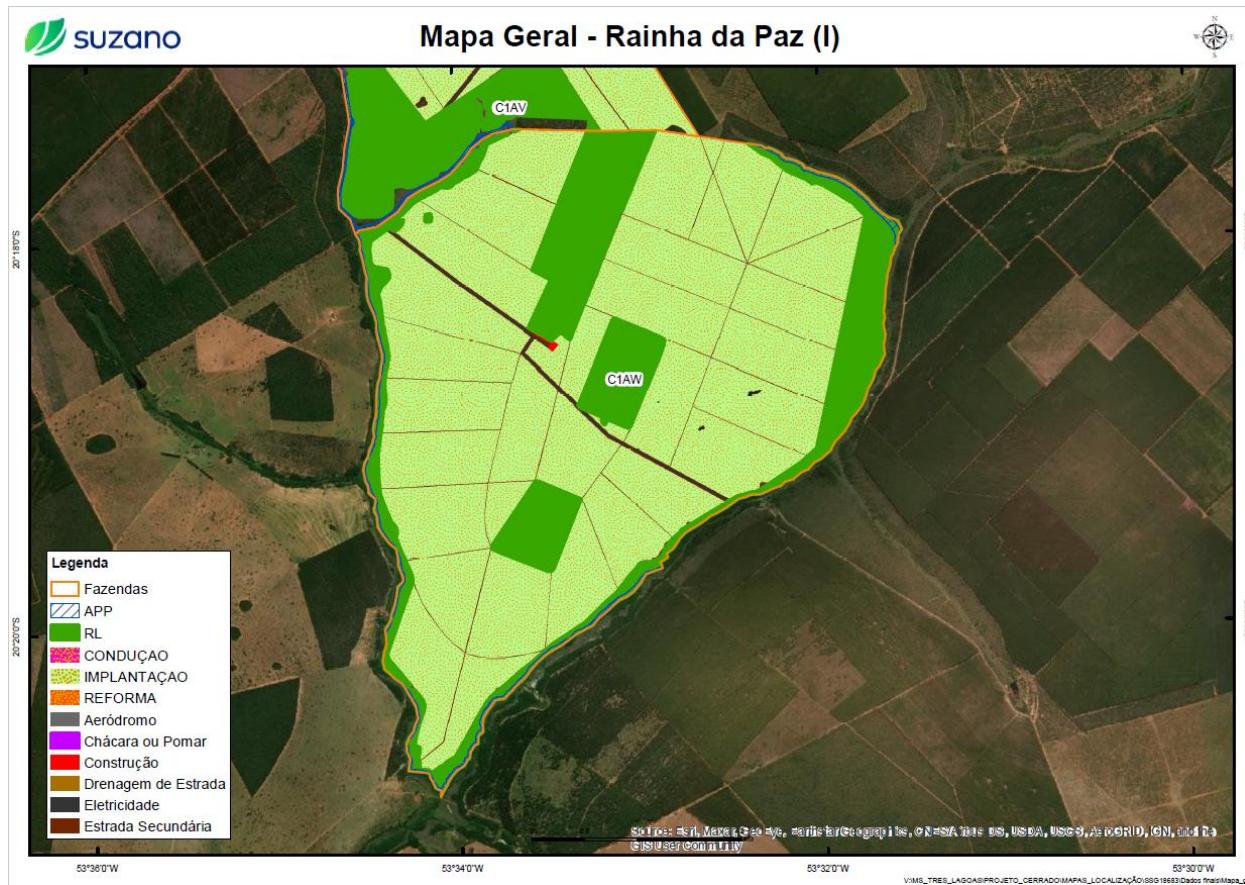


Figure 15 - Location and Stratification of Rainha da Paz. Project areas highlighted in light green.

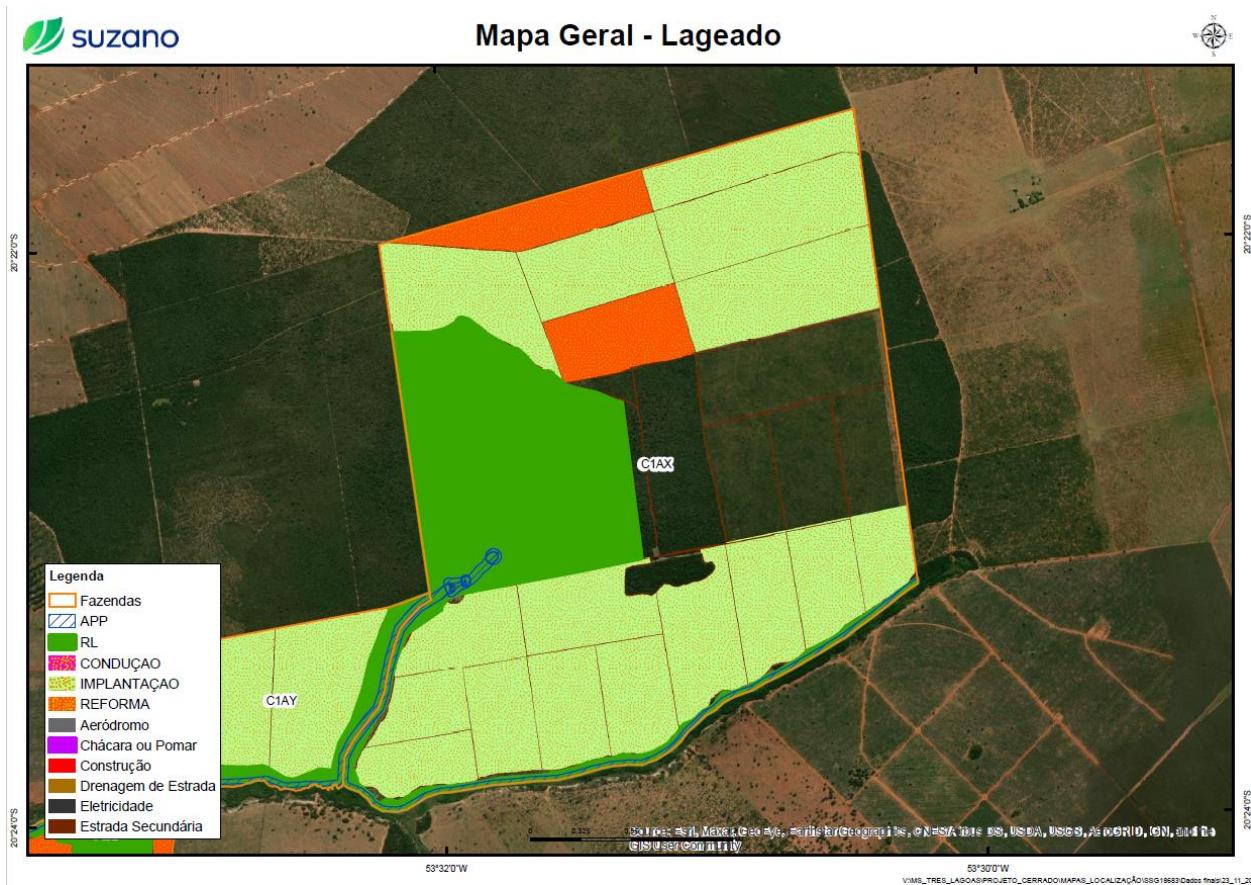


Figure 16 - Location and Stratification of Lageado (I). Project areas highlighted in light green.

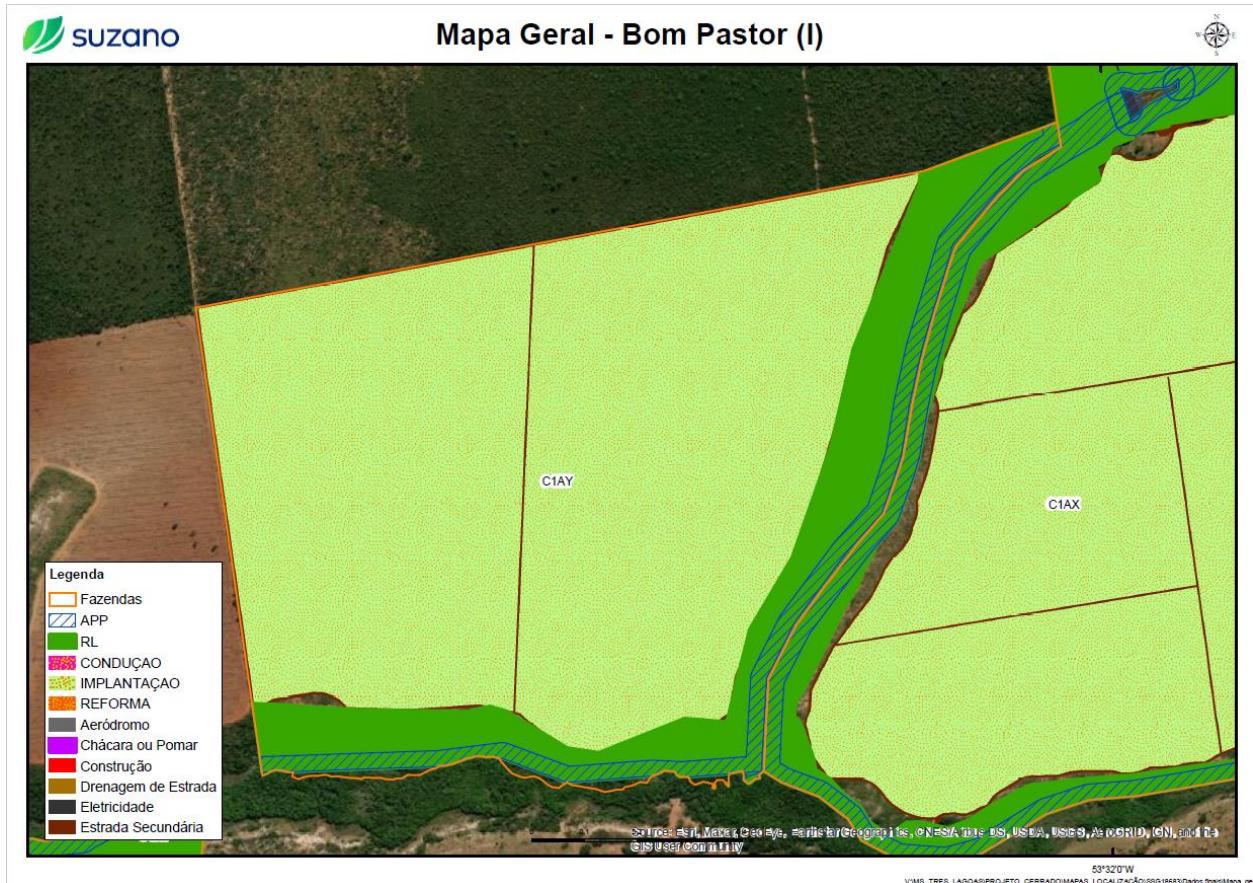


Figure 17 - Location and Stratification of Bom Pastor (I). Project areas highlighted in light green.

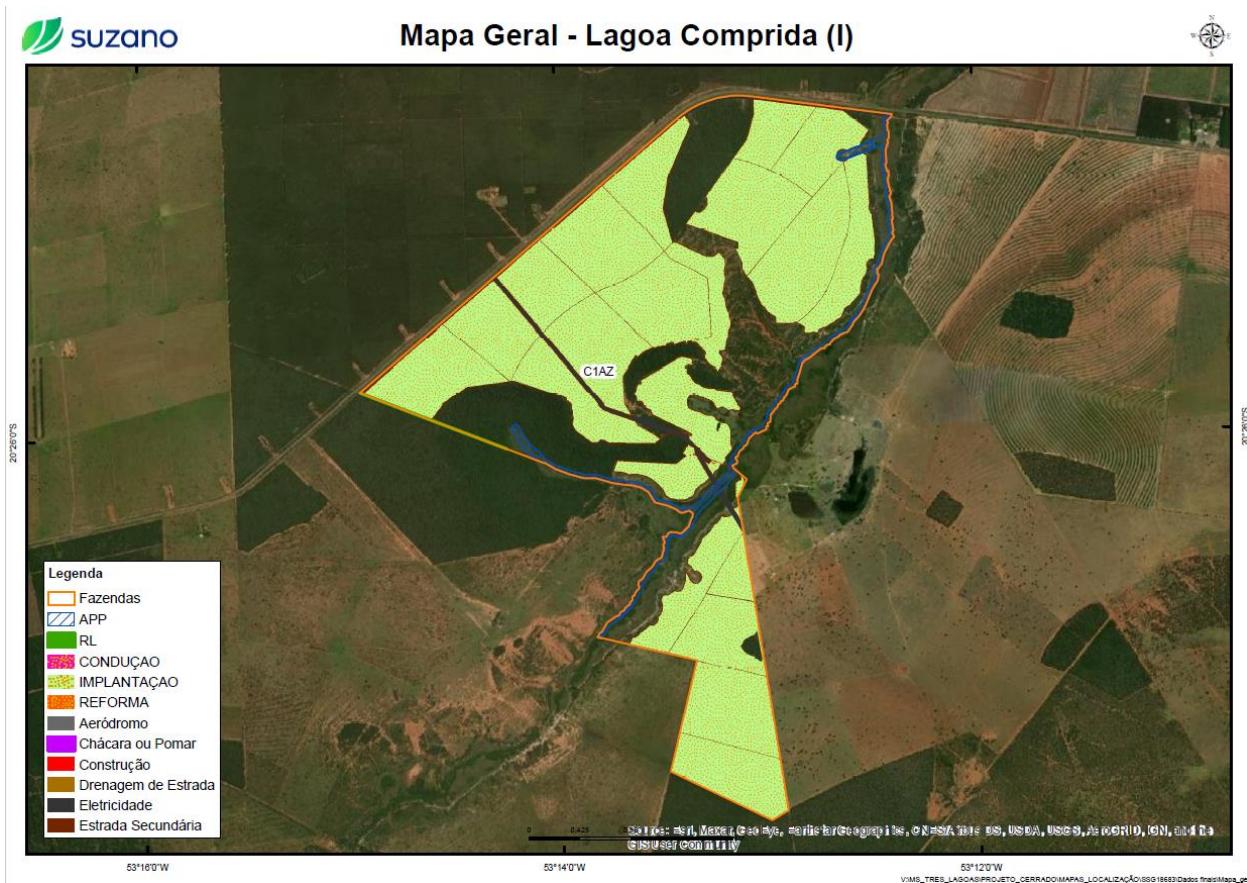


Figure 18 - Location and Stratification of Lagoa Comprida (I). Project areas highlighted in light green.

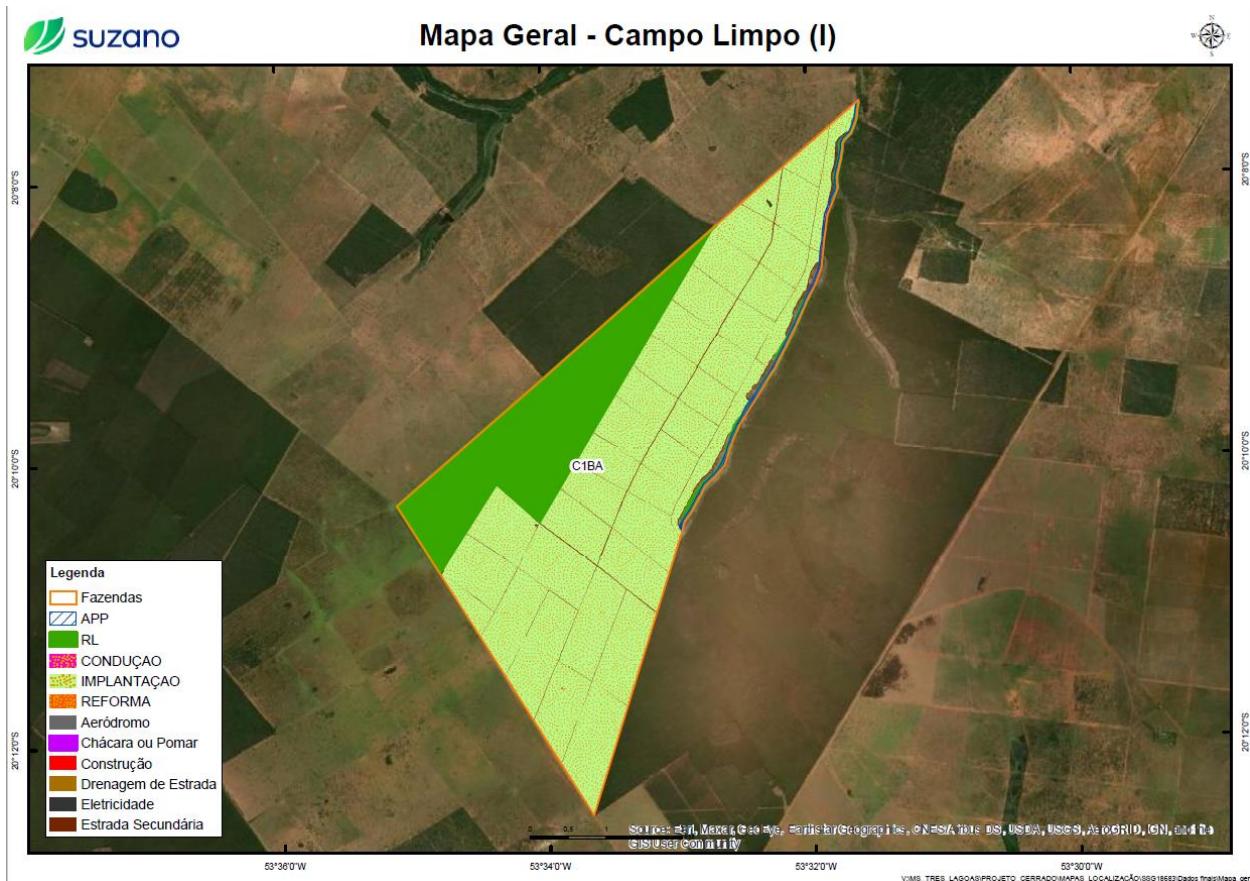


Figure 19 - Location and Stratification of Campo Limpo(I). Project areas highlighted in light green.

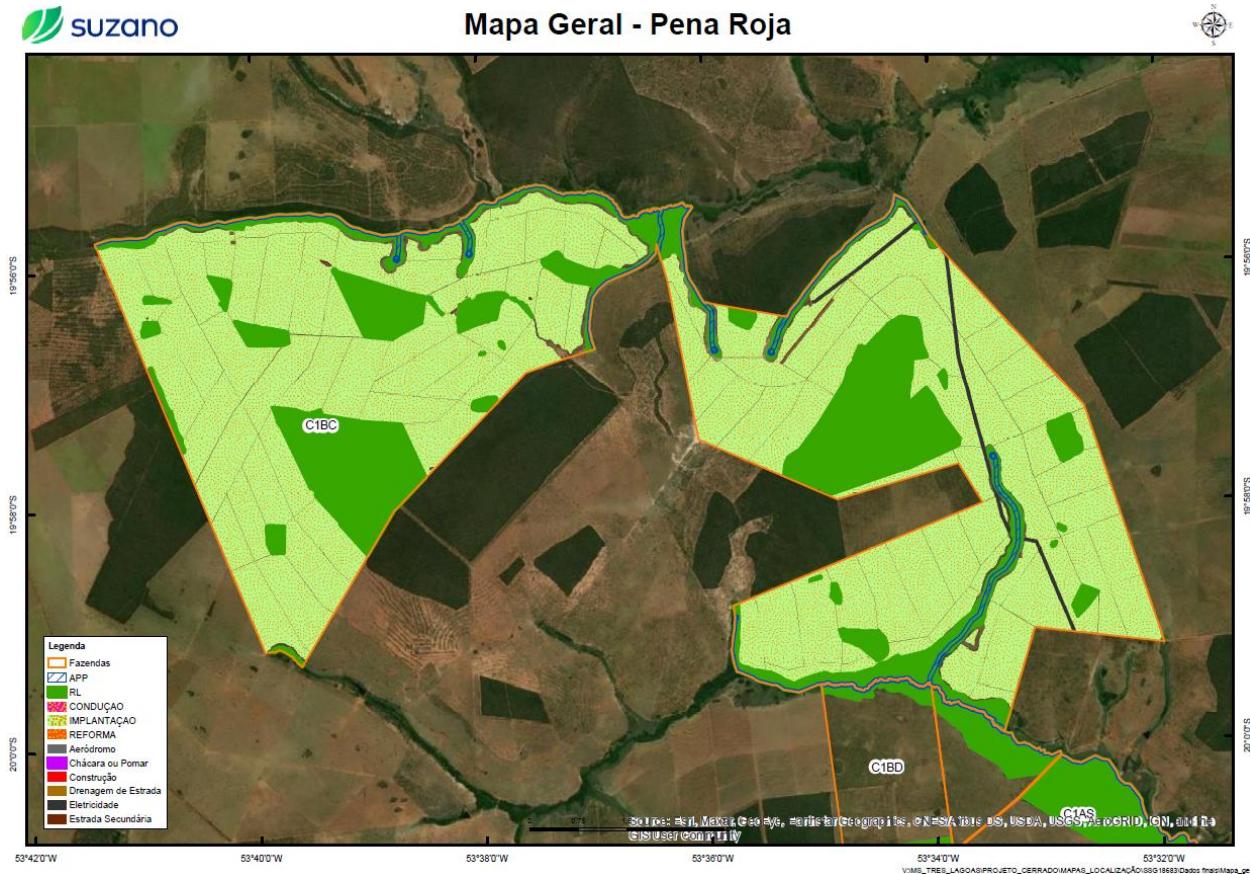


Figure 20 - Location and Stratification of Pena Roja (I). Project areas highlighted in light green.

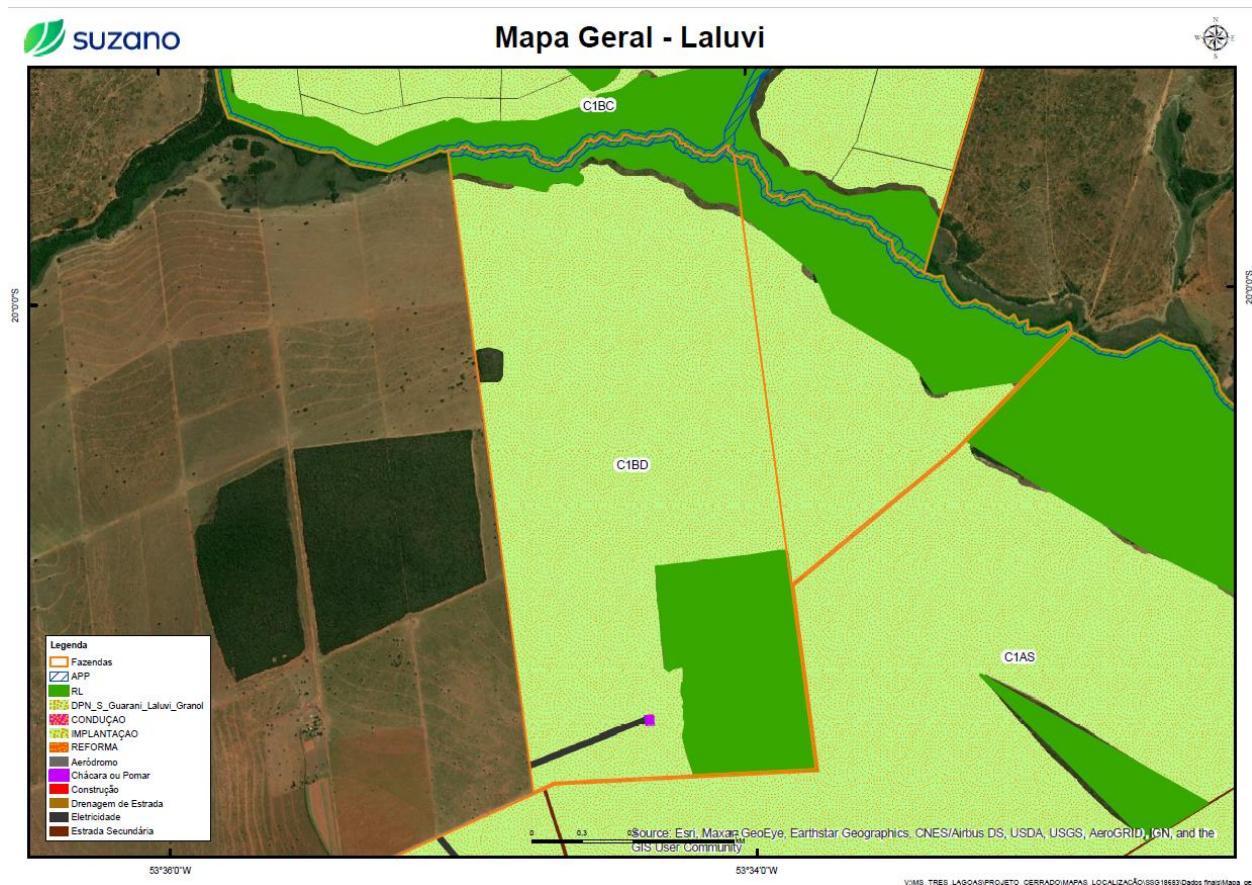


Figure 21 - Location and Stratification of Laluvi (I). Project areas highlighted in light green.

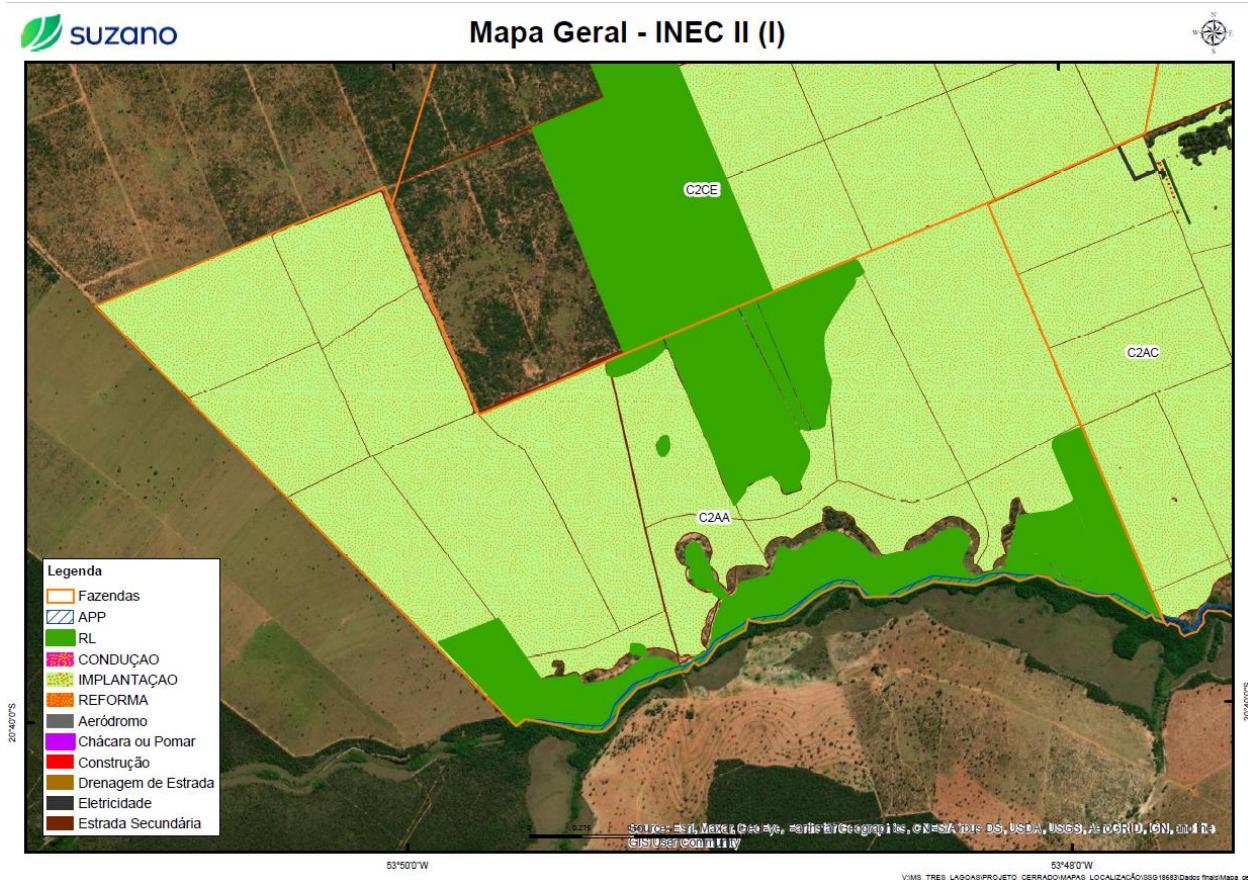


Figure 22 - Location and Stratification of INEC (I). Project areas highlighted in light green.

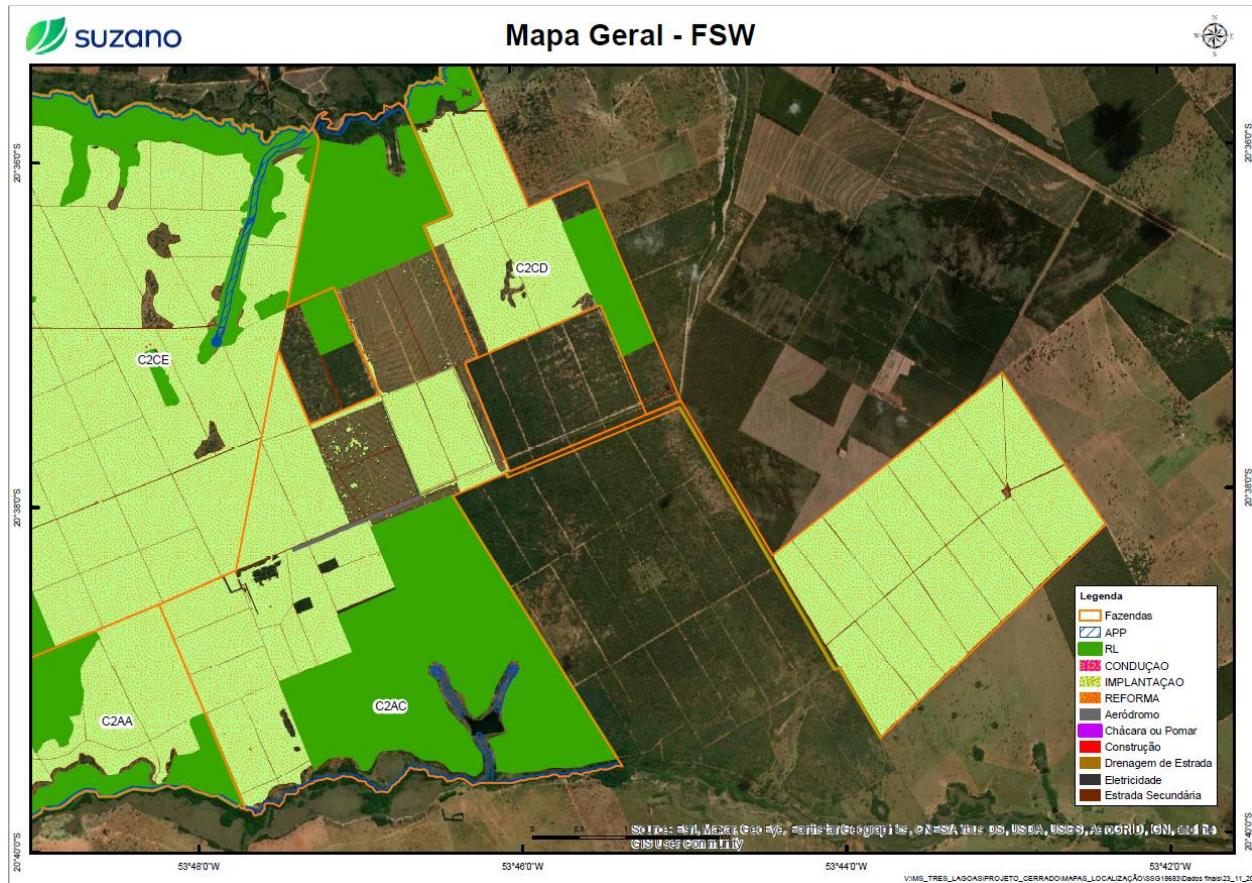


Figure 23 - Location and Stratification of FSW (I). Project areas highlighted in light green.

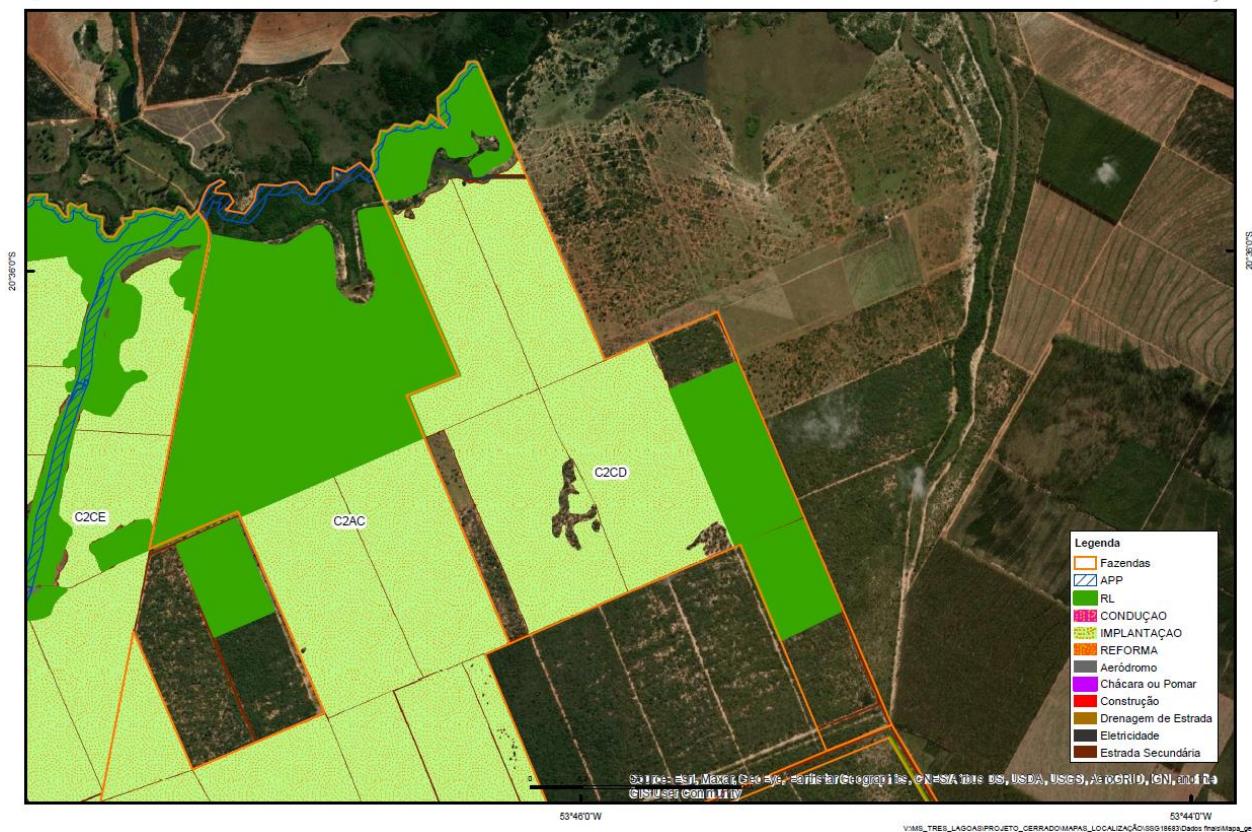
Mapa Geral - Andramil I (I)


Figure 24 - Location and Stratification of Andramil I (I). Project areas highlighted in light green.

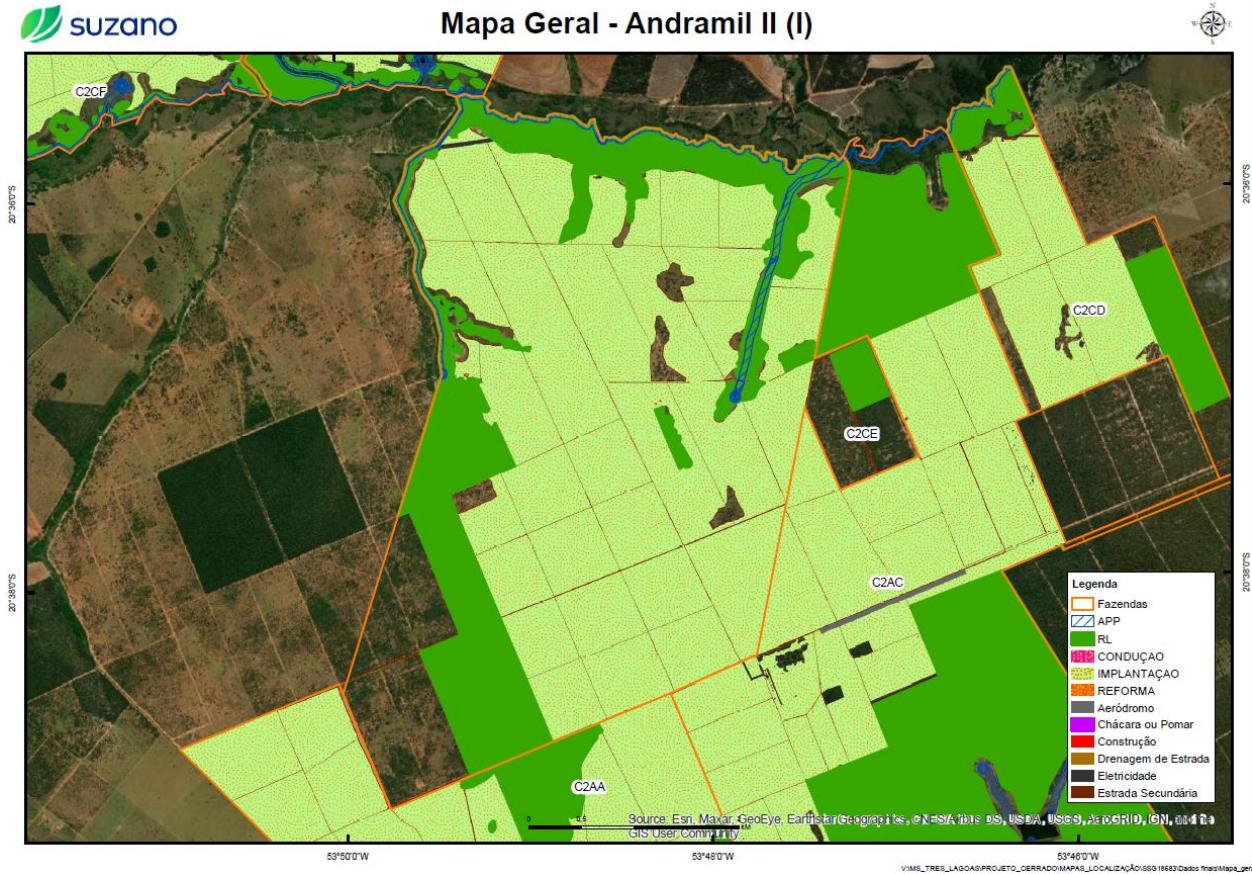


Figure 25 - Location and Stratification of Andramil II (I). Project areas highlighted in light green.

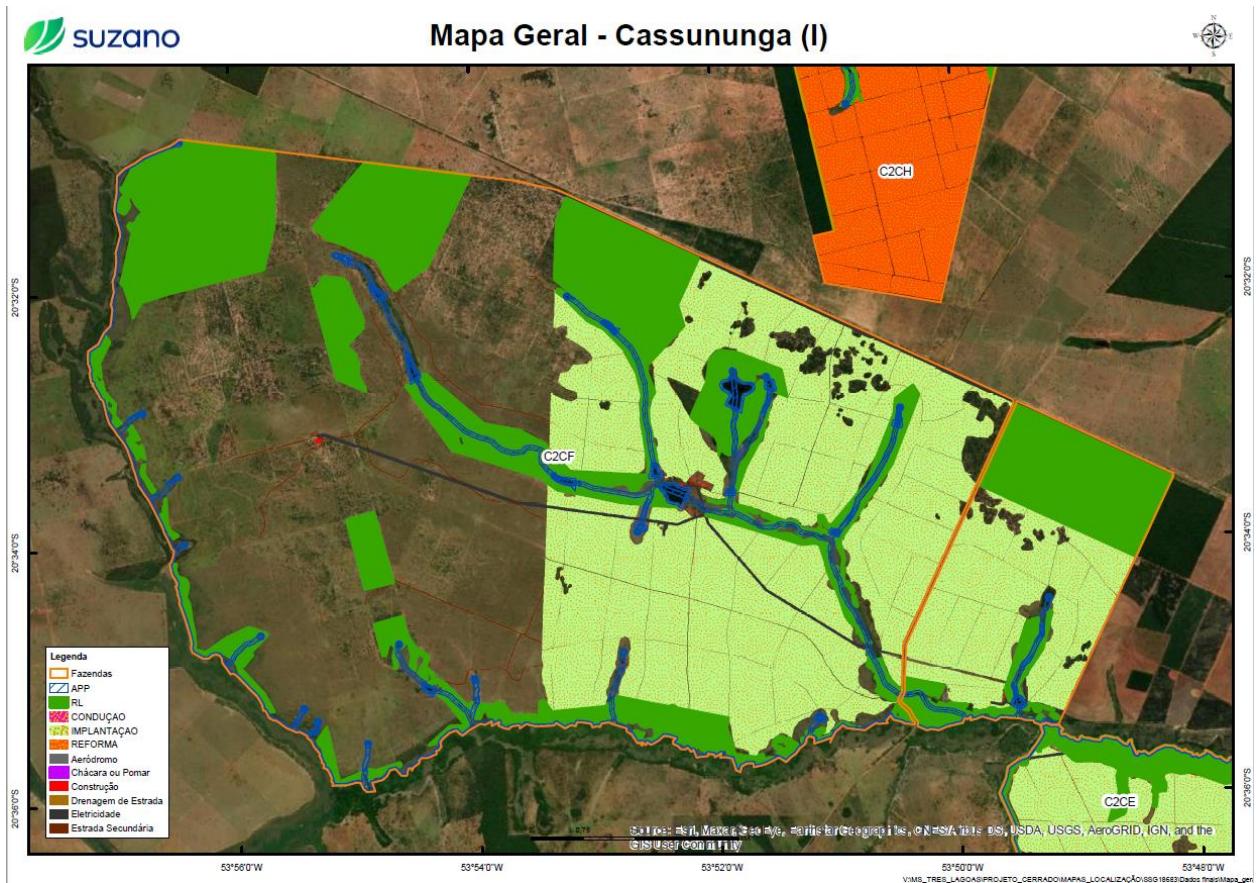


Figure 26 - Location and Stratification of Cassununga (I). Project areas highlighted in light green.

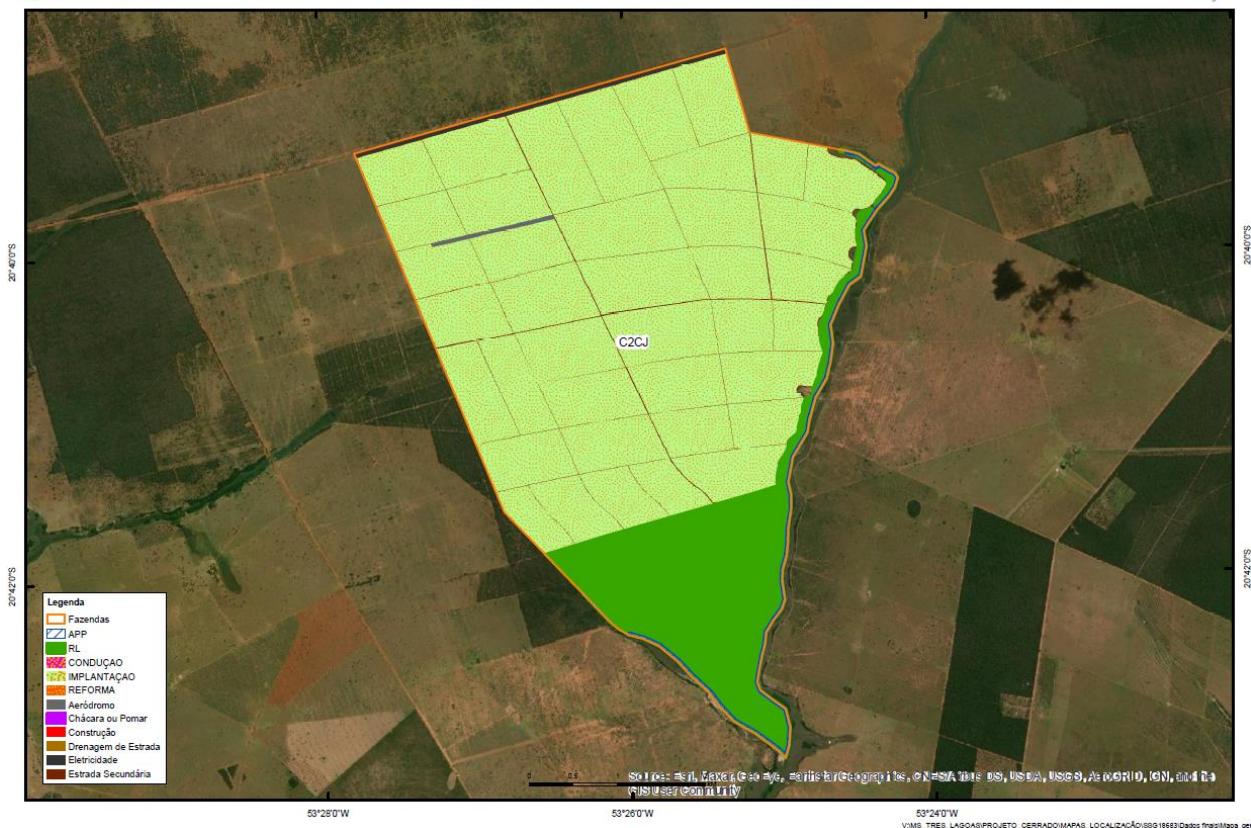
Mapa Geral - Santa Luzia (I)


Figure 27 - Location and Stratification of Santa Luzia (I). Project areas highlighted in light green.

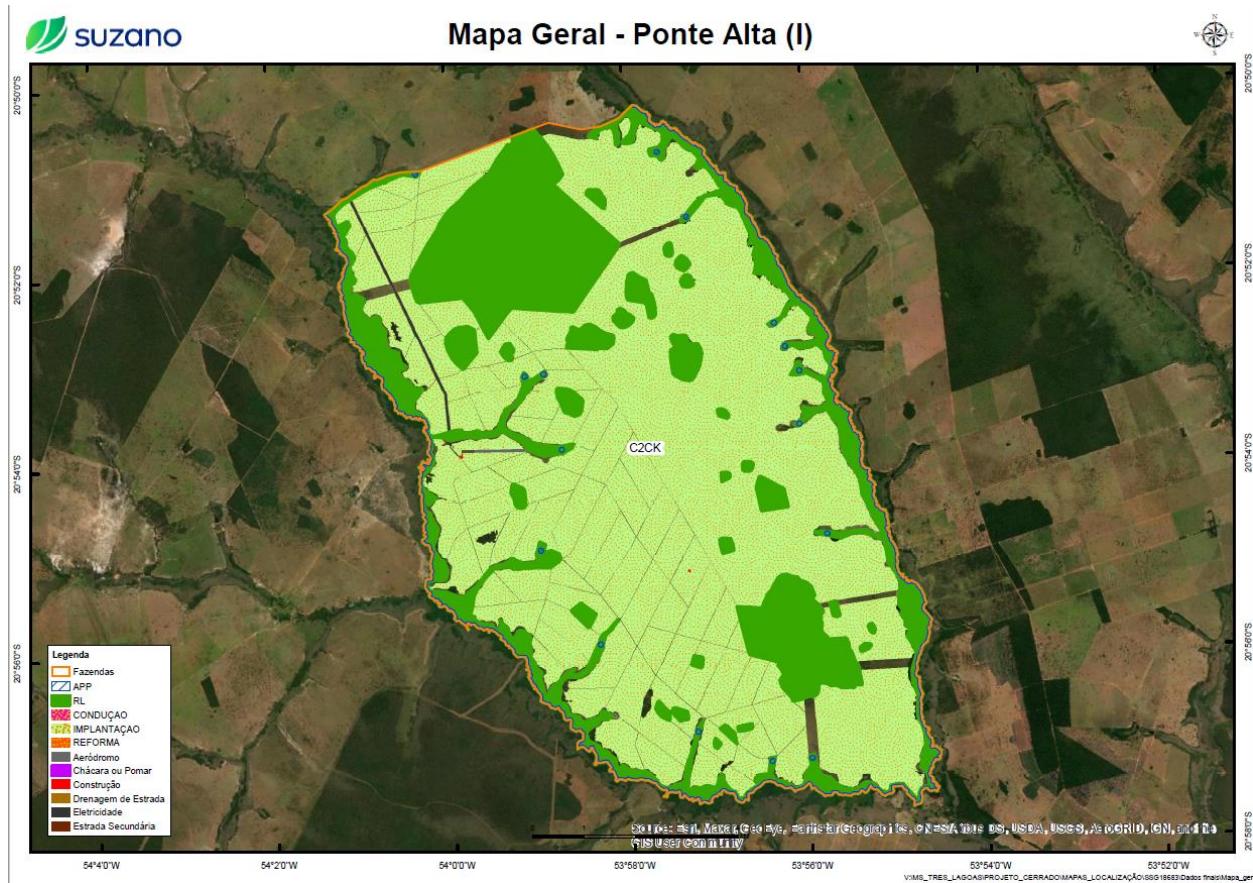


Figure 28 - Location and Stratification of Ponte Alta (I). Project areas highlighted in light green.

1.13 Conditions Prior to Project Initiation

The land within the Project Area before the start of the Project was degraded grassland, occupied by extensive cattle farming, combined with areas of Cerrado (Brazilian Savanah). The degraded land was characterized by exposed soil patches. The factors that led to this gradual depletion of pasture and soil were cattle grazing, cattle trampling and lack of rational fertilization and pasture care. Such grasslands have historically been subject to burning activities that took place with the objective to reduce tree covers and expand grasslands in order to develop extensive cattle ranching activities.

The general characteristics of the project area and reference region are described below:

Climate

The Mato Grosso do Sul, located in the macro-region of West-Central Brazil, is characterized by tropical climate; hot, humid climate prevails in the central and eastern part of the State (where the ARR Cerrado Carbon Project is located), with at least 3 months of dry season and

a longer rainy season, with the highest rainfall concentration. According to Koppen classification, in Ribas do Rio Pardo the climate type is CFA (Humid subtropical climate). These climates usually occur on the eastern coasts and eastern sides of continents, usually in the high 20s and 30s latitudes. Unlike the dry summer Mediterranean climates, humid subtropical climates have a warm and wet flow from the tropics that creates warm and moist conditions in the summer months. As such, summer (not winter as is the case in Mediterranean climates) is often the wettest season. The flow out of the subtropical highs and the summer monsoon creates a southerly flow from the tropics that brings warm and moist air to the lower east sides of continents. This flow is often what brings the frequent but short-lived summer thundershowers so typical of the more southerly subtropical climates.

Annual rainfall is between 1,200 – 1,500mm, with hydric surplus between 400-800mm for 3 to 4 months, and hydric deficit between 500-650mm for 5 months.

Hydrology

In Mato Grosso do Sul territory there are two national hydrographic basins: at west the Paraguai River basin and at east the Paraná River basin, separated by Serra das Araras, Serra Camapuã and part of Serra de Maracajú mountain ranges. The project area is located in the Rio Pardo sub-basin, in the Paraná River basin. Considering the sandy soils predominance in almost the entire extension of the river, all the river bodies have similar sedimentological aspects. At some parts of its margins there are advanced erosive processes, probably initiated by illegal deforestation and productive activities without appropriate management.

Locally, in the Project Area, there are two directions that the water streams drain the terrain: to the west in the direction of Pardo River basin; to the east in the direction of Verde River basin. Both drain to Paraná River, located at 150km to the southeast, on the artificial lake formed by the Hidroelectric Power Plant of Porto Primavera.

Topography

As seen in all the relief of the western part of the Paraná Basin, there is a slight inclination of the surface towards the south-southeast direction. Altitudes at ridges reach 550m and at valleys reach 400m.

Demography and Land Use

According to IBGE⁷, the State of Mato Grosso do Sul has a total extension of 357,145 km² (35.71 million hectares) and the resident population amounts to 2,839,188 inhabitants, with a population density of 6.86 inhabitants/km². The State is divided into 79 Municipalities, including Ribas do Rio Pardo, home to the Project. Mato Grosso do Sul has a predominantly rural economy. The most significant part is cattle raising. The State ranks third in Brazil by number of cattle (21.8 million heads - 10.9% of all cattle in Brazil). Forests cover 21% of the total area of Mato Grosso do Sul, including planted forests.

In the last 20 years Ribas do Rio Pardo has developed with the arrival of new industries and companies, which caused a high population growth. According to IBGE, in 1991 Ribas do Rio Pardo had an estimated population of 13,423 citizens and in the last Census, the estimated population in 2020 is 24,966 citizens, with a demographic density of 1.21 inhabitants per km². In Ribas do Rio Pardo, cattle raising is the main economic activity, followed by extraction of resin, vegetal coal extraction, a steel industry, and several sawmills, in addition to other small industries.

Soils

The prevailing pedological classes in the region where the activity of the ARR Cerrado Carbon Project will be implemented are: red Oxisols and Entisols Quartzipsammements, as shown in Figure 1. These types of soil are found in extensive areas of the Center-West, South and Southeast regions of the country, and is responsible for a large part of the grain production in the country.⁸

⁷ Instituto Brasileiro de Geografia e Estatística. Cidades e Estados – Mato Grosso do Sul. Available at: <<https://www.ibge.gov.br/cidades-e-estados/ms.html>>. Last access on 26 Nov. 2021.

⁸ Secretaria de planejamento e coordenação geral (SEPLAN MS), Fundação Instituto de Apoio ao Planejamento do Estado (FIPLAN MS), Coordenadoria de geografia e cartografia (COGEC), Instituto Brasileiro de Geografia e Estatística (IBGE) – Diretoria de Geociências (DGC). Soil Map. Available at: <http://www.servicos.ms.gov.br/semade_download/Mapas%20Tem%C3%A1ticos/Mapa%20Solos.pdf>. Last Access on 25 November 2021.

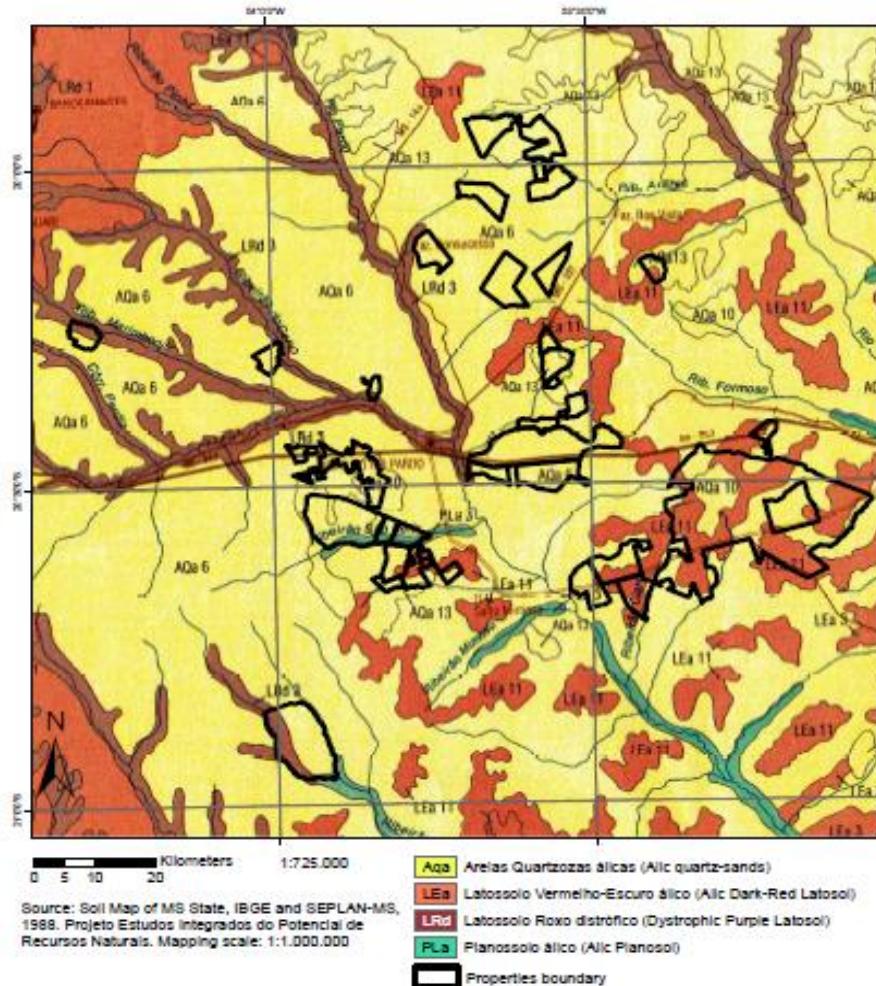


Figure 29 - Pedological map of the implementation areas of THE ARR CERRADO CARBON PROJECT. Adapted from: Source: Soil Map of MS State, IBGE and SEPLAN-MS, 1988. Integrated Studies of the Potential of Natural Resources Project.

The Oxisols have an accentuated red color due to the higher contents and the nature of the iron oxides present in the original material in well drained environments, and characteristics of color, texture and structure that are uniform in depth. Entisols Quartzipsammements, on the other hand, have a sandy texture along the profile and a uniform yellowish color below the slightly dark A horizon. Both soils occur on flat or gently undulating relief, which makes the erosion process less accentuated. However, it is necessary to be careful with erosion due to

the texture being medium to sandy, especially sandy in the case of Entisols Quartzipsamments.⁹

Because they are deep and porous or very porous, they present adequate conditions for good root development in depth. These soils are considered suitable for forestry and perennial plantations if well managed from an agronomic point of view. Besides these aspects, under natural conditions, these soils present low Carbon ("C") contents in the soil, due to the intense process of weathering, on average the C content of these soils is 3.5%,¹⁰ therefore, the soils that occur within the project boundary are not inserted in the category of organic soils, being eligible for project activity in accordance with the applied methodologies in this PDD.

Vegetation

The Project Area is located in the Phyto ecological region of arboreal savannah with gallery forest, inside the Cerrado Biome, where pasture and commercial deforestation took place regularly. For the Cerrado biome, the classification of the vegetation in the field is supported by Ribeiro and Walter (2008) who define forests as environments with a predominance of tree species and continuous or discontinuous canopy formation, while savanna formations are characterized by the coexistence of arboreal, shrub and herbaceous layers. The grassland formations are characterized by the prevalence of herbaceous and shrub species, with fewer trees and a lack of canopy formation. Figure 30 provides a pictorial representation of 12 vegetation Phyto physiognomies typical of the Cerrado, including: Riparian Forest (Mata Ciliar), Gallery Forest, Dry Forest, Tall Woodland (Cerradão), Dense Cerrado, Typical Cerrado, Sparse Cerrado, Park Savanna, Palmland, Vereda, Rupestrian Cerrado, Rupestrian Grassland, Shrub Grassland and Open Grassland (low-grass savanna).

In the project area, there are two natural Cerrado formations: Typical Cerrado and Cerradão (Tall Woodland), that are the target for conservation activities; and it is mostly occupied by abandoned pasture, that will be the areas occupied by reforestation activities. Typical Cerrado is characterized by tree cover of 20% to 50% and outstanding tree stratum, with

⁹Agência Embrapa de Informação Tecnológica. Neosolo Quartzênico. Available at: <https://www.agencia.cnptia.embrapa.br/gestor/solos_tropicais/arvore/CONT000gn230xho2wx5ok0iq1mqtarta66.html>. Last access on 25 November 2021

¹⁰CARNEIRO, Silvia Pereira. Qualidade de um Latossolo Vermelho sob diferentes tipos de uso e manejos em área do cerrado. Available at: <https://repositorio.ufmg.br/bitstream/1843/MPBB-8FXLGP/1/mestrado_silvia.pdf>. Last access on 25 November 2021

average height of 3 to 6 meters, and usually with evidence of forest fires. Tall Woodland is a forest formation with sclerophyllous characteristics (large occurrence of hard plant organs, mainly leaves) and xeromorphic (with characteristics such as reduced leaves, succulence, dense pilosity or with thick cuticles for conserving water, rendering them suitable to endure dry conditions). It is characterized by the occurrence of species found in the Typical Cerrado (Cerrado Stricto Sensu) and in forests, particularly Dry Forest and Riparian Forest. It is a forest from a physiognomic point of view, but floristically it resembles more closely the Typical Cerrado. It is a denser type of vegetation.

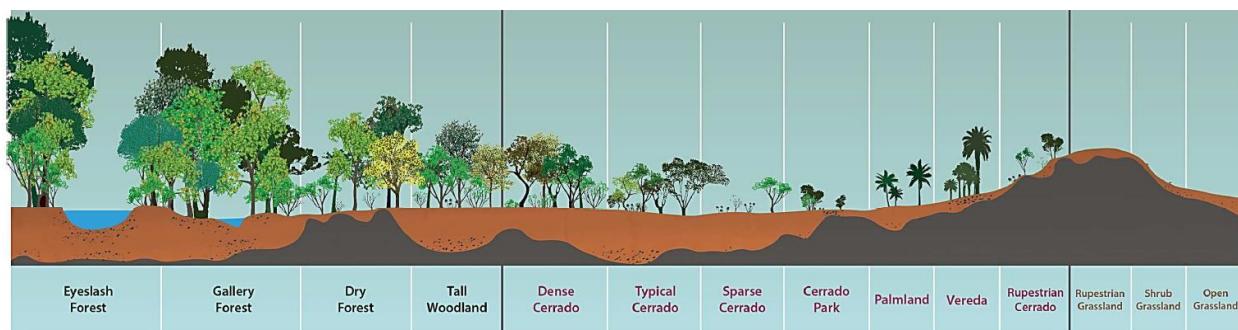


Figure 30 - Pictorial representation of the main vegetation Phyto physiognomies in the Cerrado biome, in a biomass gradient (from the largest forest formations, on the left, to the smallest ones - savannas and grasslands, on the right). Source: Adapted from Ribeiro and Walter, 2008

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project activities are compliant to all mandatory Laws, Statutes and Other Regulatory Frameworks. The most relevant regulations to which the project is subjected to are:

- Resolution CERH MS nº 25, from 3 March 2015, states the criteria for grants and rights about the use of water resources.

The grants and rights to use for the project activity will be made available at each monitoring report for each new area included.

- Resolution SEMADE nº 9, from 13 May 2015, states the standards and procedures for environmental licensing among other guidelines. According to this resolution, the plantation and conduction of native or exotic forestall species aiming for extraction or production of forestry products in lands with alternative soil use, such as agriculture and livestock, or in areas underexplored or degraded, do not need to fulfill the environmental licensing process, given the activities will not be implemented in Pantanal areas, Permanent Preservation areas, or Legal Reservation areas. The only requirement is that the responsible for the activity must submit a communication to

the IMASUL (Instituto de Meio Ambiente de Mato Grosso do Sul in Portuguese) before starting the activities.

Suzano will submit the communication letter to the IMASUL before starting the project activities. All letters shall be made available for the VVB assessment at the first monitoring event after the inclusion of new areas.

- Law nº 12.727, from 17 October 2012, defines general requirements about the vegetation protection, Permanent Preservation areas and Legal Reservation areas, the forestry exploitation, the supply of forestry raw material, control of the forestry products origin, and prevention and control of forestry fires.

The commercial plantation will neither be implemented in a Permanent Preservation area, nor in Legal Reservation areas. Moreover, the project activity seeks to preserve and restore such areas.

It is important to highlight that the project proponents are aware about the possibility of progress on the regulations during the project crediting period and are committed to follow all current and future demands and requirements, and also to the sustainable management principles.

- Law n. 8.171/1991: National regulation for agriculture and instruments for agriculture, livestock, aquiculture and forestry; in Regulating Standard N. 31: provides for the use, storage, transport, and disposal of pesticides and other agricultural inputs.

All the chemical products used in the forest plantations are authorized for eucalyptus cultivation and have MSDS available in the area. Their handling is done according to its instructions and can be applied only after Preliminary Risk Analysis and with the proper Individual Protection Equipment. All staff that handles chemical products and/or adjuvants are submitted to training according to NR31 standard for preventing accidents with chemical products and must be between 18 and 60 years old, excluded pregnant women. The completion of training and consequent permission for working in related functions is controlled by the SSQV and Operational Excellence team through the DESTRA system for third party teams and UniverSuzano for primary teams.

No one is allowed to enter or remain at site during the spraying, only the applicator, who must wear appropriate clothing for the procedure, which is dully sanitized, maintained and preserved before each application. No mechanized equipment is used for application

The products are kept in their original packaging, and in accordance with Suzano's regulatory norms and procedures, which are not reused: they must be correctly destined for the reception point.

- SDA Ordinance No. 91, of November 30, 1992: Establishes norms for the importation, use, and commercialization of dodecachlor-based formicide baits.

Currently Suzano S.A. has opted to abstain from using dodecachlor-based formicide baits on the Company's premises.

- Law no. 10.711, of August 5, 2003: Provides on the National Seed and Seedling System and makes other provisions.

The production of seedlings by Suzano is compliant with the National Registration of Seeds and Seedlings - Renasem as a seedling producer (art. 8). The cultivars are registered in the RNC. IPB2: 15534; AEC0144: 21874; FJ460: 36383. The seedlings transported are tagged with invoices, which contain appropriate information.

- Law No. 12651 of May 25, 2012 - Brazilian Forest Code: Determines the maintenance of preserved or restoring native vegetation in areas around springs or perennial water sources, whatever their topographical situation, with a minimum radius of fifty meters (permanent preservation area - APP). The intervention or suppression of native vegetation in APPs can only be carried out with specific authorization from the competent environmental agency, and in the cases of public utility, social interest or low environmental impact provided for in this law. This law allows the continuity of "agrosilvopastoral", ecotourism, and rural tourism activities in Permanent Preservation Areas in rural areas consolidated until July 22, 2008. In this case, the reforestation rules established in articles 61-A to 65 must be observed. The reforestation of Permanent Preservation Areas, in the scope of the Environmental Regularization Programs - PRA, must be done according to the criteria of article 19 of Decree No. 7.830, of October 17, 2012

The project proponent maintains the 50 meters required by law, as outlined under section 1.3. Rural Environmental Registration (CAR) was conducted for Suzano's properties and can currently be verified in the Sicar¹¹ database, where all national CAR registrations can be accessed.

¹¹ Serviço Florestal Brasileiro. Consultar demonstrativo do CAR. Available at: <<https://www.car.gov.br/#/consultar>>. Last Access on 25 November 2021.

The legal reserve and permanent preservation areas are defined and identified during the micro-planning stage of each property. The project is based on environmental zoning, environmental legislation, and the principles of forest certification. The inscription or update of the CAR will be made after the micro-planning of the area is carried out. At this step, it is identified any RL and APP deficits by satellite images, with the support of GIS tools, images obtained by UAVs (Unmanned Aerial Vehicle) and field visits.

The next step is to define the medium and long-term actions, in order to make the necessary adjustments to the Permanent Preservation Areas - APP and Legal Reserve - RL, in compliance with the Brazilian Forestry Code. Suzano also has an Environmental Restoration Program, recognized as one of the largest biodiversity conservation and environmental restoration strategies in the country. This program prioritizes the areas declared as Permanent Preservation Areas and Legal Reserves on its properties in all the Brazilian biomes.

- INMETRO Ordinance No. 547, October 25, 2012: Outlines the requirements for obtaining and maintaining the Sustainable Forest Management Unit certificate.

Suzano S.A. declares its commitment to conduct its forest stewardship system following the Principles and Criteria of FSC and NBR 14.789 CERFLOR Forest Stewardship Certifications, with the objective of providing long-term sustainability for its business, continuous improvement of its activities and performance, as well as the adoption of environmentally correct and socially responsible practices.

- State Law no. 90, of June 2nd, 1980, provides on atmospheric emissions - fixed sources. Refrain from releasing any substance into the air or polluting the environment without the proper authorization from the environmental agency (art. 3).

Any release of substances will only be carried out upon authorization from the environmental agency. The company does not perform open air burning in urban or densely populated areas.

- State Law no. 214, of March 25, 1981: Prohibits cutting trees from species in extinction and makes other provisions to avoid cutting the following endangered plant species: *Prunus avium* (angelim or cherry tree); *Tabebuia spp* (ipê); *Caesalpinia ferrea* (ironwood); *Cedrela fissilis* (cedar); *Paratecoma peroba* (peroba); *Platypodium elegans* (faveiro); *Phillanthus nobilis* (castle); *Piptadenia spp* (angico); *Astronium urundeava* (aoeira). Note: The extraction of the species can only be done by means

of a Cutting License provided by the competent environmental agency, under the terms of Decree No. 1,017, dated May 19, 1981.

The project activities will not cut the species cited in the norm. If necessary, due to force majeure, it will only be done with the express authorization of the licensing environmental agency and documentation will be duly shared with the VVB.

- Law 2.406, of January 29, 2002: establishes the State Policy for Water Resources, creates the State System for the Management of Water Resources, and makes other provisions.

The project proponent's water resources capture activities are considered exempt from licensing. Anyhow, the activities are registered, the information is evaluated and approved by IMASUL, and the declaration of user of water resources (DURH) is issued.

- Law 2.406, of January 29, 2002: establishes the State Policy for Water Resources, creates the State System for the Management of Water Resources, and makes other provisions.

The project's water resources capture activities are considered exempt from licensing. Anyhow, the activities are registered, the information is evaluated and approved by IMASUL, and the declaration of user of water resources (DURH) is issued.

- Decree No. 13,977, of June 5, 2014: Provides for the Rural Environmental Registry of Mato Grosso do Sul, the MS More Sustainable Program, and other provisions.

Suzano has a policy of not suppressing native vegetation, both inside and outside Permanent Preservation Areas. In case the company should undertake any intervention, it will occur upon express authorization from the environmental agency. The Rural Environmental Registry (CAR) was conducted for the project properties, as mentioned above.

- CBMMS Technical Standard n. 45, of 2021: provides for forest fire prevention and combat measures.

Suzano has a modern fire monitoring system, controlled by the Forestry Security area. This system counts with different tools, such as 110 forest monitoring towers that collect data each second for fire risk monitoring. The usage of this equipment has allowed a 30% reduction in the average response time in attending to fire occurrences. The field teams work in full synergy with the system operators allowing for an almost immediate intervention in fire occurrences.



The Company has 600 trained firefighters, a fleet equipped with firefighting kits, as well as water trucks and a CAF truck (compressed air foam). Suzano also works with the engagement of the neighboring communities through the Floresta Viva Program, which establishes communication channels so that anyone can indicate where there are fire spots on their plantations.

- IMASUL Ordinance n. 912, of June 02, 2021: Implements the Electronic Environmental Licensing system in the scope of the Environmental Institute of Mato Grosso do Sul.

Obligations verified and fulfilled. All processes susceptible to protocol via e-licensing are requested digitally and will be made available for the VVB assessment.

1.15 Participation under Other GHG Programs

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

The project has not been registered, nor is it seeking registration under any other GHG program.

1.15.2 *Projects Rejected by Other GHG Programs*

The project has not been rejected by any other GHG program.

1.16 Other Forms of Credit

1.16.1 *Emissions Trading Programs and Other Binding Limits*

The activities that result on the GHG removal of the project are not included in any other emission trading programs or mechanisms that includes GHG allowance trading.

1.16.2 *Other Forms of Environmental Credit*

The activities that result on the GHG removal of the project has not sought for, nor is it interested in any other forms of environmental credit.

1.17 Sustainable Development Contributions

The ARR Cerrado Carbon Project is responsible for more than just carbon fixation through reforestation. Suzano will also enforce conservation and regeneration of native vegetation areas at the project farms, additionally to the effort required by law to maintain a percentage

of the area as a legal reserve and will implement a range of social activities in benefit of local community.

It is also important to highlight how the project activity is in line with the nationally determined Contribution, conceived under the Paris Agreement, which outlines the efforts each country is willing to make in order to reduce national emissions and adapt to the impacts of climate change. The Brazilian NDC has a specific topic for the forestry and land use change sectors, where it stresses¹²:

- The importance of enforcing the forestry code, which has already been observed and resulted on further efforts on conservation and restoration of legal reserves and permanent protection areas.
- The importance of enforcing the end of illegal deforestation at the Amazonian biome and grant the compensation of emissions caused by legal vegetation suppression until 2030.
- Institute the afforestation and reforestation of 12 million Ha of forest until 2030, for different purposes. This project contributes directly to this topic, with the reforestation activity foreseen.
- Enlarge the sustainable management with native vegetation system scale.
- Implementation of the ABC Plan (Low carbon emission agriculture plan), with focus for developing sustainable agriculture, included through the additional restoration of 15 million ha of degraded pastures until 2030 and the implementation of activities and systems that integrate cattle ranching, crops and forestry in other 5 million ha.

The project benefits are also in line with the SDGs (Sustainable Development Goals), which were nationalized¹³. A percentage of the profits from credits revenue will be directed to the development of social activities, on an area of 39,002 ha, at the project surroundings, which contributes for the following SGDs:

- Goal 4 – Quality Education: The Educational Program is dedicated to improving public education through professional development of teachers and social participation focused on the students learning.

¹² MMA. REDD+ e a NDC do Brasil, 2019. Available at: <<http://redd.mma.gov.br/pt/redd-e-a-indc-brasileira>>. Last Access on 20th oct. 2021.

¹³ IPEA. ODS – Metas Nacionais dos Objetivos de Desenvolvimento Sustentável. 2018. Available at: <https://www.ipea.gov.br/portal/images/stories/PDFs/livros/livros/180801_ods_metas_nac_dos_obj_de_desenv_susten_propos_de_adequa.pdf>. Last access on 20th oct. 2021.

- Goal 5 – Gender Equality: the Good Agent project provides training of agents to prevent sexual violence against minors and elimination of violence against women, through sensitizing the project workforce and stakeholders. This project seeks to mitigate the impact caused by the industrial operation for the most vulnerable groups, and monitors the risk and occurrence of sexual violence against minors in the production, supply chain and society
- Goal 8 – Decent Work and Economic Growth: The Youth Movement project promotes entrepreneurship in rural schools to encourage young people to stay in these rural areas. The First Job project also contributes for this goal. It helps technically preparing the youth for the market and alternative occupations, income generation and workforce qualification for labor and social inclusion.
- Goal 10 – Reduced Inequality: The Promotion Notices project invests and monitors social projects proposed by the civil community organizations for institutional strengthening of such organizations, through initiatives interconnected with poverty and inequality reduction, Job and income creation and educational inclusion. The Youth Movement and First Job projects mentioned under Goal 8 also contributes for this goal.
- Goal 11 – Sustainable Cities and Communities – The Circular Cerrado project creates a new source of revenue for the local families through circular economy, where innovative economical activities that promote the biome conservation, such as functional food, biomaterials, circular fashion, sustainable extractivism, are encouraged.
- Goal 12 – Responsible Consumption and Production – The circular Cerrado project, mentioned under goal 11, also contributes for this goal.
- Goal 13 – Climate Action: The project activity itself contributes specifically for this goal, because of the emission removals promoted by the project.
- Goal 15 – Life on Land: The project activity itself contributes specifically to this goal, because of the environmental benefits caused as consequence of the activities implemented. The local fauna and flora are also frequently monitored according to specific internal operational procedures for such activities, where a technical report is elaborated at the end of the assessment.

The process is based on sampling procedures that encompass all classes of vegetation at the project site. The fauna monitoring includes avifauna and mammals and is based on direct observations, photographic registrations, and collection of traces such as footprints and feces, whereas flora monitoring is based on collecting botanical material on fixed sample plots.

The social activities abovementioned also contributes for Goal 1 – No poverty, Goal 2 – Zero Hunger and Goal 3 – Good Health and Well Being.

1.18 Additional Information Relevant to the Project

1.18.1 Leakage Management

The leakage assessment for this grouped project will be determined as per AR-TOOL15, an A/R Methodological tool for the “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity”, which sets out a procedure for assessing and estimating the increase in GHG emissions resulting from displacement of pre-project agricultural activities from the project boundary.

As previously outlined, the area is characterized as degraded pasture, hence, no crop cultivation activities would be displaced by the first group of instances. Grazing activities are also unlikely to be displaced by the project. The Phyto physiognomy of the area indicates that these areas had not been managed for a few years, given the state of the grassland seen at the areas.

The displacement of cattle activity is also unlikely. As will be discussed under the additionality analysis, at section 3.5, cattle ranching is significantly more attractive financially than any forestry activity. A recent study by IHS Markit shows that leasing areas for Forestry usage was on average 27% more expensive than for cattle ranching nationally, for the year of 2020¹⁴. Although most areas are owned by the project proponents, this corroborates the real scenario where it's highly unlikely that a forestry activity could displace cattle ranching.

Furthermore, a large part of the region's cattle ranchers operate in extensive systems, as traditionally practiced by their predecessors. However, this production system leads to the exhaustion of the land, reducing its productive capacity to the point of making the activity economically unviable. The alternative would be the operation through an intensive production system. However, land recovery and the implementation of new practices and

¹⁴ IHS Markit, 2020. Arrendamento de terras. Semestral Report - 25th edition. Available at: <<https://fnpststore.commercesuite.com.br/arrendamento-ct-34-349650.htm>>.

technologies would require high investments, making this transition impracticable for the owner.¹⁵

Thus, the land typically becomes available to the market when the family that owns the property is no longer interested in the cattle ranching business, usually when younger members are seeking better opportunities at bigger cities.¹⁶ More recently, with the expansion of Commodity production areas, there has been a considerable increase in pastureland prices in the region which has provided additional financial incentives to sell the properties.¹⁷

In addition, Suzano will develop a series of activities with local community and stakeholders which will assure best job opportunities, health, and educational conditions, and inform the population on how to develop more sustainable activities, including cattle ranching.

1.18.2 Commercially Sensitive Information

There is no commercially sensitive information omitted from the public Project Description by the project proponents.

1.18.3 Further Information

There is no further relevant information to be included about the project.

2 SAFEGUARDS

2.1 No Net Harm

This section will be completed for the VVB assessment and project registration

¹⁵ SANTOS, D. F. L; JURCA, F. L. Análise de investimento em confinamento bovino no centro-oeste brasileiro: um estudo de caso. Custos e Agronegócio online. V. 9, n.4 – Out/Dez 2013. Available at: <http://www.custoseagronegocioonline.com.br/numero4v9/opcoes%20reais.pdf>.

¹⁶ Maria Telma de Aquino Rodrigues, Araújo, C. de A., Deneson Oliveira Lima, & Conceição Maria Dias de Lima. (2020). Êxodo Rural: perspectivas dos jovens sobre a vivencia em meio rural. *Diversitas Journal*, 5(2), 729–738. Available at: <<https://doi.org/10.17648/diversitas-journal-v5i2-777>>.

¹⁷ Sauer, Sérgio e Leite, Sergio Pereira. Expansão agrícola, preços e apropriação de terra por estrangeiros no Brasil. *Revista de Economia e Sociologia Rural* [online]. 2012, v. 50, n. 3 [Acessado 22 Outubro 2021] , pp. 503-524. Available at: <<https://doi.org/10.1590/S0103-20032012000300007>>. Epub 02 Out 2012. ISSN 1806-9479. <https://doi.org/10.1590/S0103-20032012000300007>.



2.2 Local Stakeholder Consultation

This section will be completed for the VVB assessment and project registration

2.3 Environmental Impact

This section will be completed for the VVB assessment and project registration

2.4 Public Comments

This section will be completed for the VVB assessment and project registration

2.5 AFOLU-Specific Safeguards

This section will be completed for the VVB assessment and project registration

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The project activity will apply the AR-ACM0003 – Afforestation and Reforestation of Lands Except Wetlands, version 2 – A/R Large-scale Consolidated Methodology. The tools and modules to be applied are:

- VCS AFOLU Non-Permanence Risk Tool (T-BAR) – version 4.0
- AR-TOOL02: “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” – version 1;
- AR-TOOL14: “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities” – Version 04.2;
- AR-TOOL12: “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities” – Version 03.1;
- AR-TOOL08: “Estimation of non-CO₂ greenhouse gas (GHG) emissions resulting from burning of biomass attributable to an A/R CDM project activity” – version 04.0.0;
- AR-TOOL15: “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity” – version 02.0.

3.2 Applicability of Methodology

The AR-ACM0003 methodology is applicable under the following conditions:

Condition	Project adherence
The land subject to the project activity does not fall in wetland category	<p>Although the state of Mato Grosso do Sul has a biome categorized as wetland, the Pantanal, the project is located in the Cerrado biome, which has a vegetation similar to a savannah and has no flooded area or characteristics that could be categorized as wetland.</p> <p>Therefore, the project does not fall into the wetland category and the methodology is applicable.</p>
<p>Soil disturbance attributable to the project activity does not cover more than 10 per cent of area in each of the following types of land, when these lands are included within the project boundary:</p> <ul style="list-style-type: none"> (i) Land containing organic soils; (ii) Land which, in the baseline, is subjected to land-use and management practices and receives inputs listed in appendices 1 and 2 to this methodology. 	<p>As indicated under the section 1.13, the project is not located at lands containing organic soils.</p> <p>In addition, more than half of the cultivated pasture area in the Cerrado biome is degraded or in the process of degradation¹⁸. The emission of CO₂ in degraded pasture is one of the great bottlenecks of Brazilian cattle breeding. Degraded pastures have shown a reduction in carbon content in the soil¹⁹ and consequently this reduction leads to the emission of CO₂ into the atmosphere, because it loses significant amounts of</p>

¹⁸ VOLPE, E.; MARCETTI, M. E.; MACEDO, M. C. M.; ROSA Jr., E. J. Renovação de pastagem degradada com calagem, adubação e leguminosa consorciada em Neossolo Quartzarênico. Acta Scientiarum Agronomy, Maringá, v. 30, n. 1, p. 131-138, 2008.

¹⁹ FIGUEIREDO, E. B.; PANOSO, A. R.; BORDONAL, R. O.; TEIXEIRA, D. D. B.; BERCHIELLI, T. T.; LA SCALA, N. Soil CO₂-C emissions and correlations with soil properties in degraded and managed pastures in southern Brazil. Land Degradation & Development, v.28, p. 1163-1492, 2016.

	<p>organic matter²⁰. It is estimated that 60% to 90% of the carbon content of the soil is released into the atmosphere in degraded pastures, compared to a rate of 12 to 25% in a common scenario¹⁹²⁰.</p> <p>The baseline of the project is defined as extensive cattle ranching, as per the additionality analysis and section 1.13.</p> <p>Nevertheless, it is important to highlight that Suzano thrives to implement best practices available at the market, in line with FSC and other quality standards. Only the subsoiling procedure can cause disturbance to the soil, where a stem is used. Furthermore, it is based on the principle for minimum cultivation, where soil disturbance is as minimal as possible, maintaining all plant residues as coverage. Subsoiling activities are also monitored and controlled.</p>
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Applicability conditions of T-BAR – “AFOLU non-permanence risk-tool”

Condition	Project adherence
There are no internal applicability conditions	<p>As outlined under section 3.2 of the VCS Standard v4.2, all AFOLU projects must apply the non-permanence risk tool.</p> <p>This project applies the tool, as required by the standard.</p>

²⁰ EMBRAPA - Desafios e perspectivas na recuperação de pastagens degradadas na Amazônia, Belém, 2015.

Applicability conditions of AR-TOOL02 – “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities”

Condition	Project adherence
Forestation of the land within the proposed project boundary performed with or without being registered as the A/R CDM project activity shall not lead to violation of any applicable law even if the law is not enforced.	The project does not lead to violation of any applicable law, as identified in section 1.14.
This tool is not applicable to small - scale afforestation and reforestation project activities.	<p>This is not a small scale A/R project as per the definitions of the CDM: “SSC A/R CDM project activity: An afforestation or reforestation measure, operation or action:</p> <ul style="list-style-type: none"> (a) Where the average projected net anthropogenic GHG removals by sinks for each verification period do not exceed eight kilotonnes of carbon dioxide equivalent per year; and (b) Which is developed or implemented by low-income communities and individuals as determined by the host Party.” <p>The projected net anthropogenic GHG removals exceed 8.000 tCO₂e/year, and is not developed by a low-income community and individuals.</p>

Applicability conditions of TOOL14 – “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”

Condition	Project adherence
This tool has no internal applicability conditions	-

Applicability conditions of TOOL12 – “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”

Condition	Project adherence
This tool has no internal applicability conditions	-

Applicability conditions of TOOL16 – “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities”

Condition	Project adherence
The areas of land to which this tool is applied: (i) Do not fall into wetland1 category; or (ii) Do not contain organic soils as defined in “Annex A: glossary” of the IPCC GPG LULUCF 2003; (iii) Are not subject to any of the land management practices and application of inputs as listed in the Tables 1 and 2;	The tool will not be applied. Nevertheless, as mentioned previously under the AR-ACM0003 applicability conditions, this project does not fall into wetland category, nor does it contain organic soil or is subject to the land management practices mentioned in the tables 1 and 2.
The A/R CDM project activity meets the following conditions: (i) Litter remains on site and is not removed in the A/R CDM project activity; and (ii) Soil disturbance attributable to the A/R CDM project activity, if any, is: <ul style="list-style-type: none"> • In accordance with appropriate soil conservation practices, e.g. follows the land contours; 	The tool will not be applied, as the harvest cycles are due to occur each seven years. However, as per the project management practices, the litter is not removed from the site, and the soil disturbance is limited, given the project implements the best practices available at the market for soil preparation, plantation and harvest.

<ul style="list-style-type: none"> Limited to soil disturbance for site preparation before planting and such disturbance is not repeated in less than twenty years. 	
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Applicability conditions of TOOL08 – “Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity”

Condition	Project adherence
The tool is applicable to all occurrence of fire within the project boundary.	<p>This project activity does not include burning biomass. In addition, all due fire prevention measures are provided by Suzano.</p> <p>In case of a loss event caused by fire, a loss event report will be duly submitted to Verra as per the VCS Standard.</p> <p>In this case, this tool will be applied.</p>
Non-CO2 GHG emissions resulting from any occurrence of fire within the project boundary shall be accounted for each incidence of fire which affects an area greater than the minimum threshold area reported by the host Party for the purpose of defining forest, provided that the accumulated area affected by such fires in a given year is ≥5% of the project area.	<p>This project activity does not include burning biomass. In addition, all due fire prevention measures are provided by Suzano.</p> <p>In case of a loss event caused by fire, a loss event report will be duly submitted to Verra as per the VCS Standard.</p> <p>In this case, given the threshold of fire occurrence in ≥5% of the area is met, this tool will be applied.</p>

Applicability conditions of TOOL15 – “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity”

Condition	Project adherence
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This tool is not applicable if the displacement of agricultural activities is expected to cause, directly or indirectly, any drainage of wetlands or peat lands.	This project activity does not cause the displacement of agricultural activities. As previously mentioned, the activity implemented before the project was extensive cattle ranching. The project also does not cause directly or indirectly the drainage of wetlands or peat lands. Although the state of Mato Grosso do Sul has a biome categorized as wetland, the Pantanal, the project is located in the Cerrado biome, which has a vegetation similar to a savannah and has no flooded area or characteristics that could be categorized as wetland.
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3.3 Project Boundary

Table 2 - Sources of GHG emissions included in or excluded from the project activity boundary

Source	Gas	Included?	Justification/Explanation
Baseline	Above and below ground biomass	CO ₂	Yes This is the major carbon pool subject to project activity as per the ACM0003 definitions. This pool is represented by isolated trees and grassland, which will be harvested for implementing this project. For each area where suppression will be necessary, the suppression license will be provided for VVB assessment, and such carbon stock will be duly accounted by the project.
		CH ₄	No This is not a requirement of the methodology
	Dead wood and litter	N ₂ O	No This is not a requirement of the methodology
		CO ₂	Carbon stock in this pool is expected to increase due to implementation of the project activity. The tools for accounting such pools have no internal applicability conditions.
		CH ₄	No This is not a requirement of the methodology
		N ₂ O	No This is not a requirement of the methodology
		CO ₂	No This carbon stock is optional as per the ACM0003. Thus, it is not applicable for this project activity as per the

Source	Gas	Included?	Justification/Explanation
Soil Organic Carbon			TOOL16 which defines the condition of “Limited to soil disturbance for site preparation before planting and such disturbance is not repeated in less than twenty years”.
	CH ₄	No	This is not a requirement of the methodology
	N ₂ O	No	This is not a requirement of the methodology
	CO ₂	No	CO ₂ emissions due to burning of biomass are accounted as change in carbon stock
	Burning of woody biomass	CH ₄	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology.
			The project proponents will not burn biomass for site preparation or forest management.
		N ₂ O	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology. The project proponents will not burn biomass for site preparation or forest management.

Source	Gas	Included?	Justification/Explanation
Above and below ground biomass	CO ₂	Yes	This is the major carbon pool subject to project activity as per the ACM0003 definitions. This pool is expected to increase with the implementation of the project activity.
	CH ₄	No	This is not a requirement of the methodology
	N ₂ O	No	This is not a requirement of the methodology
	Dead wood and litter	CO ₂	Carbon stock in this pool is expected to increase due to implementation of the project activity. The tools for accounting such pools have no internal applicability conditions.
			This is not a requirement of the methodology
		N ₂ O	This is not a requirement of the methodology
	Soil Organic Carbon	CO ₂	This carbon stock is optional as per the ACM0003. Thus, it is not applicable for this project activity as per the TOOL16 which defines the condition of “Limited to soil disturbance for site preparation before planting and such disturbance is not repeated in less than twenty years”.
		CH ₄	This is not a requirement of the methodology

	N ₂ O	No	This is not a requirement of the methodology
Burning of woody biomass	CO ₂	No	CO ₂ emissions due to burning of biomass are accounted as change in carbon stock
	CH ₄	No	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology. The project proponents will not burn biomass for site preparation or forest management.
	N ₂ O	No	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology. The project proponents will not burn biomass for site preparation or forest management.

The project does not account for sources of GHG emissions, given no burning of biomass will occur during the project activity.

Furthermore, as per AR-ACM0003, GHG emissions resulting from removal of herbaceous vegetation, combustion of fossil fuel, fertilizer application, use of wood, decomposition of litter and fine roots of N-fixing trees, construction of access roads within the project boundary, and transportation attributable to the project activity shall be considered insignificant and therefore accounted as zero.

The map below illustrates the initial areas considered for the project activity.

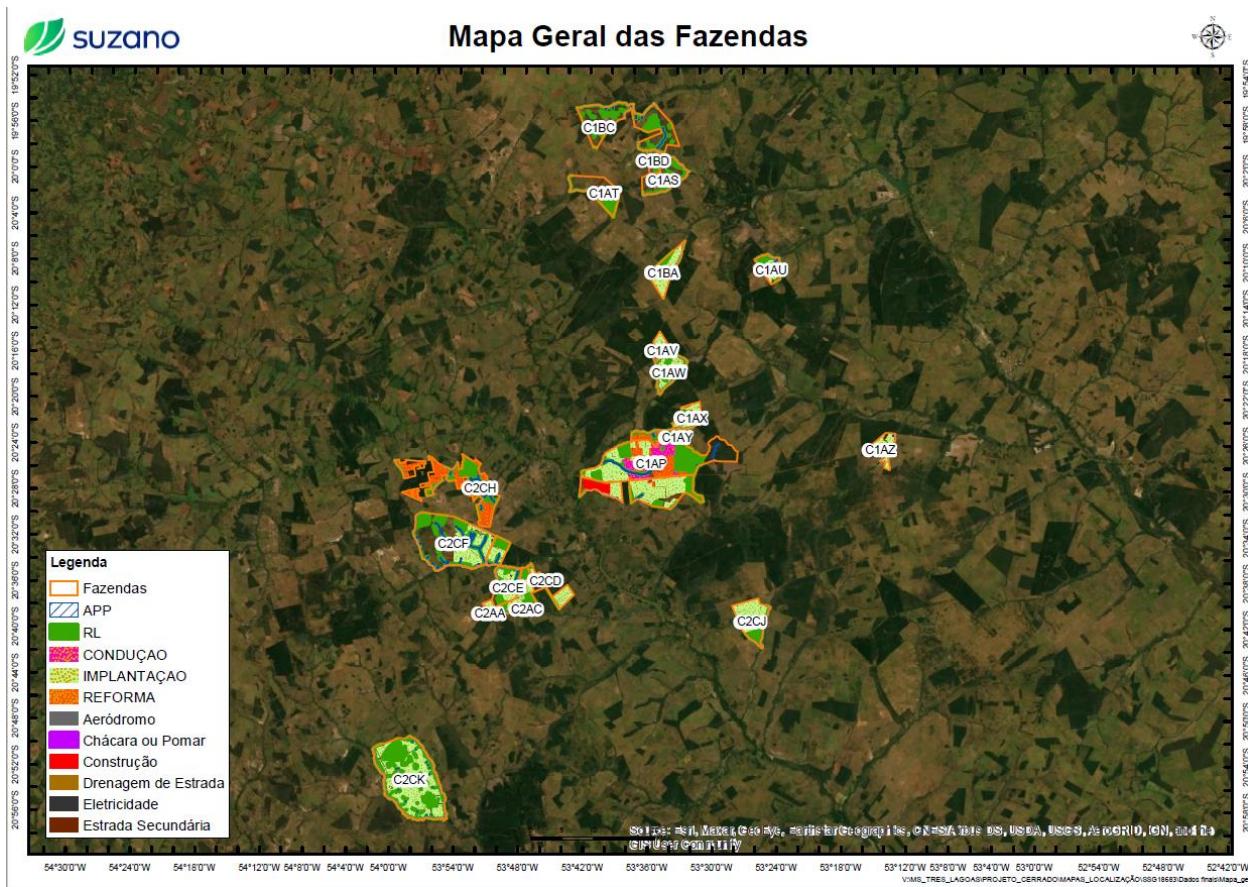


Figure 31 – Project activity map, where the project area is highlighted in light green.

3.4 Baseline Scenario

For the project activity to be implemented, the baseline scenario is identified on section 3.5, following the steps outlined at the AR-TOOL02, “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities”.

The base scenario is constituted by large areas of grassland (38.708 ha) with sparse trees in landscape. The pasture areas, mostly occupied by extensive cattle raising, consist of raising cattle on pasture. This is generally done without major investments and with the occupation of large areas, considered ideal for the so-called beef cattle.²¹

The main incentives of extensive cattle raising are the low investment needs, although there are still expenses with mineral replacement and supplementation, depending on the type of

²¹ LANGE, Anderson; DANTAS, Jeferson; FREDDI, Oná S.; et. al. Degradação do solo e pecuária extensiva no norte de Mato Grosso. Available at: <<https://periodicoscientificos.ufmt.br/ojs/index.php/nativa/article/view/6838>>. Last Access on 26 Nov. 2021.

animal being raised. The disadvantages are the need to occupy large areas, which can generate environmental problems because of the availability of pasture and the lack of cattle feed in this type of breeding system. Historically, cattle ranchers in the region use the practice of burning the vegetation to clean the soil, either to prepare for planting or to form pasture.²²

The use of fire to "prepare" the soil causes negative environmental impacts, since it eliminates fundamental nutrients for any vegetative crop, such as potassium and phosphorus, kills microorganisms that help the development of plants, reduces the humidity of the soil and facilitates the process of soil degradation. Also worth mentioning are the problems of air pollution and even the pollution of springs, groundwater, and rivers by the ashes.²²

Over the years, abusive extensive cattle raising has caused a serious process of pasture degradation characterized by: deterioration of the pasture; small patches of land erosion; and reduced soil fertility (decrease in macro and micro trace elements and organic matter). Pasture degradation originates from factors such as: cattle feeding pressure (during grazing, cattle ingest large amounts of green fodder, which contains nutrients derived from the soil); lack of rational soil fertility management, which is a necessary practice to replenish the nutrients extracted from the soil by grazing; cattle trampling, affecting areas where pasture rotation is not practiced, which leads to reduced vegetation cover, exposing the soil to rainfall and subsequent erosion and exhaustion of the superficial fertile layer; the shrinking of the original tree cover as the tree plants present in the pastures are seen as competitors for light, nutrients, and forage water. For this reason, there is a tendency to eliminate the tree component from the landscape, reducing soil resistance to erosion and causing increased evaporation of water present in the soil.²³

This is the configuration of the landscape prior to the start of project activities.

3.5 Additionality

²² ARAUJO, Fernando M.; SILVA; Janete R.; COSTA, João V.S.. As queimadas e sua relação com o desmatamento no bioma cerrado. Available at: <https://www.researchgate.net/profile/Janete_Rego/publication/333450782_AS_QUEIMADAS_E_A_SUA_RELACAO_COM_O_DESMATAMENTO_NO_BIOMA_CERRADO/links/5cee8befa6fdcc791692bcd/AS-QUEIMADAS-E-A-SUA-RELACAO-COM-O-DESMATAMENTO-NO-BIOMA-CERRADO.pdf>. Last access on 26 Nov. 2021.

²³ NOGUEIRA, Deise C. S.; TAVANTI, Renan F. R.; MONTANARI, Rafael; et. Al. Variabilidade espacial da emissão de CO₂ em sistema silvipastoril e pastagem degradada na região do Cerrado. Available at: <<http://cadernos.abagroecologia.org.br/index.php/cadernos/article/view/6278/2380>>. Last access on 26 Nov. 2021.

The AR-TOOL02, “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities”, version 01 is used for the assessment of the additionality and identification of the baseline.

The applicability conditions for the tool are detailed under section 3.2 and fully met.

The additionality and baseline identification must follow the steps:

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

STEP 1. Identification of alternative scenarios

STEP 2. Barrier analysis

STEP 3. Investment analysis (if needed)

STEP 4. Common practice analysis

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

If the project participants claim that the afforestation or reforestation project activity has a starting date after 31 December 1999 but before the date of its registration, then the project participants shall:

- *Provide evidence that the starting date of the A/R project activity was after 31 December 1999, and*
- *Provide evidence that the incentive from the planned sale of CERs was seriously considered in the decision to proceed with the project activity. This evidence shall be based on (preferably official, legal and/or other corporate) documentation that was available to third parties at, or prior to, the start of the project activity.*

Outcome:

Although the start date (in 2019) is before the project registration date, the project proponents have been considering credits revenue for its commercial plantation activities since 2017, when a prior consideration letter was submitted to the CDM board²⁴, proving its intention in registering a project and consideration of the credit's revenue. It is important to highlight that the entity name registered accounts for Fibria Celulose S/A, which was initially in charge of developing the project and was

²⁴ CDM Prior Consideration Registry. Available at: <https://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html>. Last access on 26 Nov. 2021

incorporated by Suzano in 2018 having the operation at Ribas do Rio Pardo continue under similar circumstances.

In addition, the start date of the project activity is of 19 July 2019, after 31 December 1999, as required by the AR-TOOL02.

Moreover, later on 12 December 2019²⁵, Suzano made a communication to the market, where the company informs the acquisition of the land where the project activity will be developed. Detailed information about the acquisition of each specific area was provided to the VVB for a better assessment and detailed at section 1.7.

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

This step serves to identify alternative land use scenarios to the proposed CDM project activity that could be the baseline scenario, through the following sub-steps:

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

Identify realistic and credible land-use scenarios that would have occurred on the land within the proposed project boundary in the absence of the afforestation or reforestation project activity under the Verified Carbon Standard (VCS). The scenarios should be feasible for the project participants or similar project developers taking into account relevant national and/or sectoral policies and circumstances, such as historical land uses, practices and economic trends.

SCENARIO 01: Continuation of extensive cattle farming

The first alternative land use scenario is the permanence of extensive cattle ranching in degraded grasslands, in continuation of the pre-project land use. The agricultural establishments in the state of Mato Grosso do Sul total an area of 30.5 million hectares, where 60.4% are occupied by natural and planted pastures, used mainly for cattle production. The state accumulates 19.5 million heads of cattle, representing 11.3% of the national cattle herd (172.7 million heads of cattle)²⁶.

²⁵ Suzano's communication to the market from 12 Dec. 2019. Available at: <https://s1.q4cdn.com/987436133/files/doc_news_pt/fatos-relevantes/13986_726131.12.12_CM_Gestao-de-Ativos-no-Mato-Grosso-do-Sul_PT-EN.pdf..pdf>. Last Access on 26 Nov. 2021.

²⁶ IBGE. Resultados definitivos Mato Grosso do Sul. Available at: <https://censo.ibge.gov.br/agro/2017/templates/censo_agro/resultadosagro/pdf/ms.pdf>. Last Access on 26 Nov. 2021.

The grasslands used for cattle raising were originally occupied by the Cerrado, which, after the process of deforestation or suppression of vegetation, were converted to pasture. This deforestation process is still in force in Brazil. In 2019, an estimated 1.29 million ha were deforested, of which 33.5% occurred in the Cerrado biome¹. The indiscriminate advance of the agricultural frontier for production, especially soybeans and cattle raising, is currently the main threat to Brazilian Cerrado.

Therefore, it can be concluded that livestock farming is characteristic for Mato Grosso do Sul and for the whole country. It is clearly established in the regional economy. Hence, the alternative Scenario 01 is deemed as a plausible alternative land use scenario to the project activity.

SCENARIO 02: Afforestation of the land within the limits of the Project carried out without registration as an AFOLU VCS project activity

Scenario 02 represents the afforestation of the land within the limits of the Project carried out without being registered as an AFOLU VCS project activity.

In Brazil, the planted tree sector has been an important indicator of the economic, social and environmental development, since it promotes local economic change, offers new job opportunities and generates income for the population. Additionally, it contributes to climate change adaptation, mitigation and the provision of ecosystem services.

Usually, the wood produced by commercial plantations is consumed by the industrial sector of pulp and paper, as a source to renewable energy production through biomass, to produce charcoal, to produce furniture and to be used as an input to the construction sector.

In 2019, the total area of planted trees totaled 9.0 million hectares in Brazil, which is an increase of 2.4% compared to 2018 (8.79 million hectares, considering the adjustment according to the new methodology)²⁷.

Therefore, Scenario 02 is deemed as a plausible alternative land use scenario to the project activity.

²⁷ IBÁ – Indústria Brasileira de Árvores; Relatório 2020, ano base: 2019. Brasília – DF; 2020, 66p.

SCENARIO 03: Land use within the project boundary for soy farming

Scenario 03 refers to the destination of the areas within the project boundary to soy production. The expansion of soybean cultivation in Brazil, particularly in the Cerrado, happened because of a series of technical and political factors. These range from biotechnological innovations, such as the production of cultivars that are adapted to the edaphoclimatic conditions of this biome and its variations, to the inevitable participation of the State as a promoter and articulator of private agents, all due to the external demand for commodities²⁸.

In the period between January and November 2020, soybean exports in the state of Mato Grosso do Sul reached an export value of (US\$ FOB) 1.62 billion, an increase of 42.4% compared to 2019²⁹. To demonstrate the evolution of soybean crop expansion in the state, Figure 32 - Mato Grosso do Sul. Evolution of soybean planted area: 1990, 1995, 2000, 2005, 2010 and 2015.represents the spatialization of data that conclusively attest to the expansion of the planted area in the last decades in the state. This predatory form of expansion is consistent with the dynamics of modern production; there is still the advance of crops over portions of native vegetation, as well as a more technological management of crops, increasing their average yield per hectare through the massive use of fertilizers and pesticides³⁰

²⁸ FACCIN, A. C. T. M. Complexo soja no Mato Grosso do Sul: competitividade regional e vulnerabilidade territorial. Tese (Doutorado em Geografia). Faculdade de Ciências Humanas, Universidade Federal da Grande Dourados. Dourados, 2017.

²⁹ Governo Federal – Ministério da Indústria, Comércio Exterior e Serviços. ComexVis Available at: <<http://comexstat.mdic.gov.br/pt/comex-vis>>. Last Access on 26 Nov. 2021.

³⁰ CAMPOS, Margarida C.. Modernização da Agricultura, Expansão da soja no Brasil e as transformações socioespaciais no Paraná. Geografar Magazine, Curitiba, v. 6. N. 1. P. 161-191. June/2011. Available at: <<https://revistas.ufpr.br/geografar/article/download/21808/14203>>. Last Access on 26. Nov. 2021.

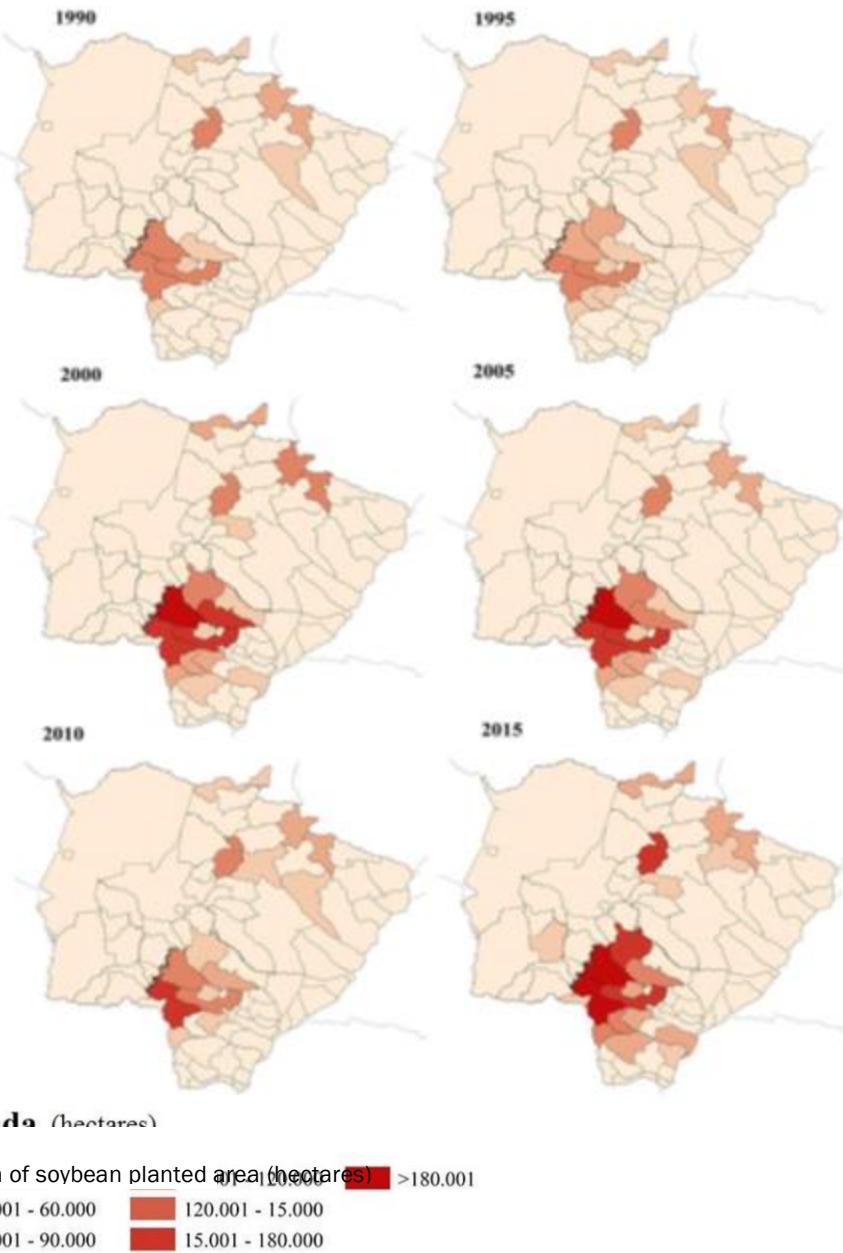


Figure 32 - Mato Grosso do Sul. Evolution of soybean planted area: 1990, 1995, 2000, 2005, 2010 and 2015.³¹

It is a fact that the expansion of commodity cultivation encounters few obstacles in frontier agricultural areas, suggesting that the growing volume of soybean production

³¹FACCIN, Ana C. T. M. Complexo Soja no Mato Grosso do Sul: competitividade regional e vulnerabilidade territorial. Available at: <<https://repositorio.ufgd.edu.br/jspui/handle/prefix/390>>. Last Access on 26 Nov. 2021.

in the state rather occurs because of horizontal expansion (occupation of new areas) than vertical expansion (increase in yield).

Therefore, Scenario 03 is deemed as a plausible alternative land use scenario to the project activity.

Outcome:

As an outcome of sub-step 1a. the following alternative land uses were identified: Cattle farming, afforestation of the land within the limits of the project carried out without registration as an AFOLU VCS project activity, and soy farming.

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

This step requires the demonstration that all land use scenarios identified in the sub-step 1a are in compliance with all mandatory applicable legal and regulatory requirements.

SCENARIO 01: Continuation of extensive cattle farming

The applicable laws for the continuation of extensive cattle farming are:

- Law n. 6.938, from 31 August 1981, which states the necessity to register the activity under the Federal Technical Record, at the IBAMA, for potential pollutant activities;
- Law n. 12.727 from 17 October 2012, which states the standards for the protection of the vegetation, areas for permanent preservation, Legal reservation, as well other guidelines;
- Law n. 8.171/1991: National outlines for agriculture and instruments for agriculture, livestock, aquiculture and forestry.

SCENARIO 02: Afforestation of the land within the limits of the Project carried out without registration as an AFOLU VCS project activity

The most relevant regulations and laws for the forest plantation activity are mentioned at subsection 1.14.

SCENARIO 03: Land use within the project boundary for soy farming

The applicable laws for the continuation of extensive soy farming are:

- Law n. 12.727 from 17 October 2012, which states the standards for the protection of the vegetation, areas for permanent preservation, Legal reservation, as well other guidelines;
- Law n. 8.171/1991: National outlines for agriculture and instruments for agriculture, livestock, aquiculture and forestry;
- Law n. 13.366 from 1 December 2016: Guidelines for plantation and commercialization of the genetically modified soy production from 2004 and other guidelines;
- Law n. 5.025 from 19 July 2017: Sanitary measures for preventing, controlling and eradicating the Asian Soybean Rust and other guidelines;
- Law n. 11.105 from 24 March 2005: States the standards and guidelines for safety surveillance mechanisms of activities that involve Genetically Modified Organisms.

Outcome:

All scenarios are in accordance with applicable laws and regulations and would not be prevented from implementation. The alternative land use scenarios are Cattle farming, afforestation of the land within the limits of the project carried out without registration as an AFOLU VCS project activity, and soy farming.

STEP 2. Identification of barriers that would prevent the implementation of at least one alternative land use scenarios

This step serves to identify barriers and to assess which of the land use scenarios identified in the sub-step 1b are not prevented by these barriers.

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

Identify realistic and credible barriers that prevent realization of the land use scenarios identified in Sub-step 1b. The barriers should not be specific for the project participants but should apply to the proposed VCS project activity as such, even if similar project developers would have developed the project activity.

BARRIERS RELATED TO LOCAL TRADITION OF LAND USE:

In the state of Mato Grosso do Sul, livestock and more recently also agriculture are essential to the state's economy since it boosts the industrial sector and services.

Livestock farming is a cultural legacy in the region, which gave the state a prominent position among the other Brazilian federations, with the 5th largest effective herd in the country, reaching the mark of 19.5 million cattle heads and a production of 424 million liters of milk in the latter. It is an activity transmitted through generations of local producers.

During the last two decades, there has been an effective advance in the implementation of agricultural crops (soybean, corn, rice, etc.) and forest plantations.

According to the last agricultural census in the State of Mato Grosso do Sul, livestock represents 44.3% of land use, being the most representative activity, followed by agricultural crops with 11.8%, and by forest plantations, which represents only 3.3% of the land use in the State³².

Although there is an initiative for implementing other activities in the agricultural sector, the current situation of land use in the State reflects, without objections, the inclination of the local tradition to the permanence of livestock, to the detriment of agricultural crops and even more so to the activity of reforestation.

Therefore, the historical context and the strong local tradition suggests that the most likely land use scenario in the absence of the ARR Cerrado Carbon Project would be characterized by livestock farming. Hence, local tradition is considered a barrier for Scenario 02 (commercial forest plantations) and scenario 03 (soy farming).

INSTITUTIONAL BARRIERS:

When reviewing the structure of the national agribusiness productive chain, it is noticeable that the State has a major role, which can clearly be attributed to the

³² IBGE – Censo Agropecuário, Mato Grosso do Sul. Available at: <<https://cidades.ibge.gov.br/brasil/ms/pesquisa/24/0>>. Last Access on 26 Nov. 2021.

period known as the "modernization of agriculture". During that period, public policies were established seeking to intensify economic transactions through political and social discounts, whether in the commercial, financial or technological ambit, for the agricultural, industrial and service sectors.

Studies based on official data have highlighted the importance of State intervention in the process of transformation of the regions, which have been under analysis since 1970. For example, the implementation of Prodecer (Japan-Brazil Agricultural Development Cooperation Program of the Cerrado Region) was fundamental for the introduction of soybean cultivation and to attract farmers from other regions of the country.

Despite the recent institutional uncertainty in the country, agribusiness in Brazil is recognized for its participation in the national economy, which safeguards its support even in times of institutional crisis. A survey by the National Confederation of Agriculture and Livestock (CNA) shows that the Gross Value of Production in 2020 reached R\$ 728.6 billion, which is the highest real figure in the history of the sector. Compared to 2019, the sector had an increase of 11.8%. Amid the pandemic, agribusiness is expected to account for 23.6% of the country's total GDP.

These statistics corroborate State initiatives to promote Brazilian agribusiness, such as the recent Agribusiness Law (Law No. 13,986/20), created on April 7, 2020, which deals with incentives created by the government to stimulate the sector after the Covid-19 pandemic. In a brief description, the Agribusiness Law presents legislative innovations in several areas of agribusiness, addressing topics ranging from financing to rural credit, which brings a relevant increase in legal security for domestic and foreign investors.

On the other hand, although Brazil has one of the world's largest forests, the Brazilian federal legislation still does not define planted forests, though the term is inserted in Decree No. 5,975/06, Law No. 11,284/06 and the current Forest Code No. 12,651/12. In fact, Brazil's current participation in the world market of forest products is the result of private initiative. There is an important gap to be filled by the State as an inducer of development, capable of planning and working on public policies aimed at fostering and financing the planted forest sector. Based on the information exposed, it can be assessed that institutional interference has been and is still fundamental to agriculture and cattle ranching activities. Given its relative size to the country's economy, it is highly unlikely that this institutional support may be discontinued in the future. Thus, the lack of similar structures to the forestry sector

are major setbacks for implementing such activities and can be defined as a barrier for the scenario.

In the last few years, the political scenario also testified how the rural entities gained power. Currently, the Agrobusiness Parliamentary front counts with over 280 politicians, from senators to deputies, which advocate in favor of the usage of pesticides and growth of agriculture and cattle ranching.³³

TECHNOLOGICAL BARRIERS:

Access to technological inputs are strongly related to financial incentives for the modernization of agriculture and technology transfer. The profitable production of crops such as soybeans are closely linked to the implementation of such technologies.

Soy was commercially introduced in Brazil in the 1960s in Rio Grande do Sul and for the last 50 years it has expanded to all regions of the country. However, there are still two major bottlenecks regarding technological components which impact the profitability of agricultural crops: low productivity and high production costs).

The lower levels of productivity are related to the occurrence of the Asian rust disease, which fostered the Brazilian producers' choice to an intense use of fungicides. The control of the disease has been threatened by the progressive resistance of the fungus to agrochemicals, hence, efficiency has been lost during the last years, making it increasingly difficult to limit the damage caused by rust.

Another aspect related to the decrease in productivity is the spontaneous, or invasive, presence of weeds. To maintain high yields of commercial crops, there has been control of spontaneous species in order to avoid competition for environmental resources, or even to avoid reduction of the technical harvest coefficient and an increase in the percentage of impurity and humidity of grains.

In 2006, the first cases of resistance were detected, and since that date, resistant biotypes of *Lolium multiflorum* (azevém), *Digitaria insularis* (capim-amargoso), *Eleusine indica* (capim-pé-de-galinha), and three species of buva (*Conyza canadensis*, *Conyza sumatrensis* and *Conyza bonariensis*) are present in the production areas. Areas infested with resistant weeds are more difficult to manage

³³ Frente Parlamentar da Agropecuária. Members. Available at: <<https://fpagropecuaria.org.br/todos-os-membros/>>. Last access on 29 Nov. 2021.

and have higher production costs. Productivity losses can vary depending on the species and the infestation but can reach 70% in the most serious cases. It is estimated that the current average cost of weed's resistance in Brazil is almost R\$ 5 billion. When adding the losses from the competition, this value can reach R\$ 9 billion annually.

Even with institutional incentives, it is important to highlight that technological setback is still present in soy farming to be able to treat and prevent such diseases. The joint analysis of the limiting aspects for the implementation of soy farming corroborates the preference of rural producers in Mato Grosso do Sul to remain with the cattle ranching activities that are already consolidated in the region. These activities are under an extensive management that does not demand any kind of great technological commitment, instead of incurring the risks of producing soy and other grains which are extremely dependent on technological inputs, as previously explained.

The forest activity presents a different scenario. It is not a traditionally widespread activity and demands previous technical knowledge about planning and cultivation techniques. The success of a forest plantation, whether for restoration or wood production, is closely related to the technical mastery of aspects such as the choice of species for cultivation, ecological suitability, management and conservation of soil for cultivation, silvicultural treatments suitable for the conduct of the species, management techniques, and harvesting.

The logistics involved in harvesting and transportation operations are also critical for forest production, where all the operations involved must be optimized. The logistics aspects are mentioned in the Investment barrier analysis. Furthermore, to control for the activities to be carried out, it is necessary to know, with the greatest possible precision, the restrictions and alternatives inherent to each operation. The most common restrictions that involve such operations are, among several others, the slope of the land, planting spacing, volume of trees, management adopted, and power and productivity of the machines.

In addition to these aspects, the reforestation activity has additional costs compared to other agricultural activities, such as the removal of stumps after harvesting. This is an onerous activity necessary to convert the area into other uses after the rotation cycle, which makes the activity even less attractive to rural producers.

Based on what has been discussed above, there is a clear tendency for producers to opt for cattle ranching over soy plantations and forestation activities. For both activities, it is necessary to mobilize a considerable number of resources, as well as technology and knowledge, which is scarcely available on the market.

INVESTMENT BARRIERS:

As previously mentioned, agribusiness in Brazil contributes significantly to the development and growth of the country by placing it in a prominent position, especially regarding food production and the export of primary products.

With the country achieving a higher market share in the world market for food and primary products, government investments in favor of rural producers are growing to optimize their productive activities. Thus, through public policies, rural producers feel safer to make investments that allow for an increase in income.

A relevant factor when considering an investment is the return time of the amount invested. It is known that reforestation activities require a significant investment, which is determined according to the technical, operational and economic planning of the enterprise. Assuming that the risks are overcome, planting needs a much longer period of time than the return of annual agricultural activities. When considering a short cycle for eucalyptus production, the financial return would be after 7 years. Meanwhile, the area is occupied without generating income.

In addition, in the last decade, the value of reforestation wood in general, oscillated below the Inflation, which denotes low wood prices and brings dissatisfaction to producers. Recent studies point out a trend of a reduction in wood prices following the supply growth, as it is a product substituted by native wood.³⁴

For the eucalyptus forests in Mato Grosso do Sul, a relevant complication is the distance between the forests and the industries. A radius of 150 kilometers is usually a threshold from which the transportation of the raw material (wood) is no longer viable. Despite this, there are many planted forests located in areas of difficult access

³⁴ ALMEIDA, Jaqueline Sousa. Dinâmica temporal dos preços de madeira serrada de Eucalyptus sp. No estado de São Paulo. Available at: <<https://www.eumed.net/rev/oel/2019/03/precos-madeira-serrada.html>>. Last Access on 29 Nov. 2021.

or with precarious roads, which makes the costs of bringing the raw material to the industries too expensive.³⁵

Under such conditions, farmers are unlikely to take the risks and challenges of long-term investment, rather than continuing with a well-known land use activity, with higher financial returns that also occurs on a short-term horizon, which constitutes an investment barrier for forest plantations.

These are unfavorable aspects to reforestation in the region where the present project will be implemented, the low price of wood added to the high costs of logistic operations and the direction of State incentives to competing activities, makes the activity far less attractive and, thus, in line with the generation of carbon credits.

BARRIERS BY SOCIAL CONDITIONS:

Technology transfer in rural areas occurs through rural extension, whose main tool is technical assistance. This has been pointed out in several studies as one of the main bottlenecks for the implementation of new crops and technology among rural producers. Technical Assistance and Rural Extension Services do not reach all farmers, as the agricultural census points out. Technical guidance reaches only 22% of establishments, this indicates a serious failure in the transfer of technology to the rural environment. This gap in the technical assistance service is associated with staff shortages and the extinction of the Ministry of Agrarian Development, which was the governmental representative that would be responsible for managing rural extension policies at the federal level.

The success of a forestry or agricultural company also depends on professionals with adequate technical competence, capable of indicating solutions to challenges such as the absence of adequate infrastructure for production outflow, lack of fiscal incentives and instability of the foreign exchange market. These challenges highlight the importance of good management of all processes in the forest chain, from the planning stages, definition of the wood purchasing market, choice of the best suppliers of materials, and services and efficient control in the purchase of inputs. In eucalyptus production chain, for example, to preserve the quality of the logs, the cutting and delivery logistics for the industry must be just in time. For this, the planner

³⁵ ORTIGOZA, Francielly de S. S.; SENNA, Ricardo J.. Caracterização do segmento de florestas plantadas de eucalipto em Mato Grosso do Sul. Available at: <<https://seer.sede.embrapa.br/index.php/RPA/article/download/1126/1001>>. Last access on 29 Nov. 2021.

must be equipped with solid information on the productivity of forests, quality, strategy, and logistics. In other words, the technical competence of the manager, such as the eucalyptus planted forests, is a determining factor as to whether the activity is bound to be successful and whether local labor force lacks skilled professionals for this position.

Another characteristic of the planted forest sector in Ribas do Rio Pardo is the need to improve the coordination issues, especially the alignment among agents for knowledge generation, planning and technology transfer to the local population, who traditionally does not have the knowledge for the proper development of activities other than cattle raising, highlighting the lack of qualified labor in the region.

The need for technical and highly specified knowledge is evident, as it is generally inaccessible to a rural producer simply interested in such activity. This is another reason for the rural producer in Mato Grosso do Sul to prefer to continue the use of land for livestock, rather than opting for activities such as reforestation or soybean plantations.

Outcome:

Significant barriers have been identified for some of the scenarios identified on Step 1: Barriers related to local tradition of land use; Institutional barriers; Technological barriers; Barrier to investment and Barriers by social condition.

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

Determine which land use scenarios identified in the Sub-step 1b are prevented by at least one of the barriers listed in sub-step 2a. Substantiate, that the barrier identified as preventing realization of a land use scenario is valid and conclusive in the context of the land use scenario in question. The assessment of a barrier may take into account the level of access to and availability of information, technologies and skilled labour in the region where the planned VCS project activity is located. Eliminate these scenarios from further consideration.

If the land within the boundary of the proposed of the VCS project activity was at least partially forested since 31 December 1989 and the land is not a forest at the project start, identify reasons/actions/incentives that allowed for the past forestation and demonstrate

that the current legal/financial or other applicable regulations or socio-economical or ecological or other local conditions have changed to the extent that allows for conclusion that repetition of the forestation performed without being registered as the VCS project activity is not possible.

Include all land use scenarios that were identified in the Sub-step 1b and were not eliminated in the Sub-step 2b into the list of land use scenarios that are not prevented by any barrier.

The following table identifies which barrier applies to each scenario, as described under the sub-step 2.a:

SCENARIO	SCENARIO 01: Continuation of extensive cattle farming	SCENARIO 02: Afforestation of the land within the limits of the project boundary for registration as an AFOLU VCS project activity	SCENARIO 03: Land use within the project boundary for soy farming
BARRIER			
Barriers related to local tradition of land use		X	X
Institutional barriers		X	
Technological barriers		X	X
Barrier to investment		X	
Barriers by social conditions		X	X

Outcome:

Given the barriers identified for scenario 02 and scenario 03, only the first scenario is still applicable. Therefore, the list of land use scenarios that are not prevented by any barrier is composed by Scenario 01: Continuation of extensive cattle farming.

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

Apply the following decision tree to the outcome of sub-step 2b:

Is forestation without being registered as an A/R CDM project activity included in the list of land use scenarios that are not prevented by any barrier?

→ If yes, then: *Does the list contain only one land use scenario?*

→ If yes, then *the proposed A/R CDM project activity is not additional.*

→ If no, then continue with Step 3: *Investment analysis.*

→ If no, then: *Does the list contain only one land use scenario?*

→ If yes, then *the remaining land use is the baseline scenario. Continue with Step 4: Common practice test*

→ If no, then through qualitative analysis, assess the removals by sinks for each scenario and select one of the following options:

Option 1: Baseline scenario is the land use scenario that allows for the highest baseline GHG removals by sinks. Continue with Step 4: Common practice test,

Option 2: Continue with Step 3: Investment analysis.

Outcome:

The forestation without the AFOLU VCS project activity is not included in the list of land use scenarios not prevented by any barrier. The list contains only one scenario. Proceed to step 4.

STEP 3. *Investment analysis*

This step serves to determine which of the remaining land use scenarios identified in the Sub-step 2b is the most economically or financially attractive. For this purpose, an investment comparison analysis is conducted.

Sub-step 3a. Determine appropriate analysis method

Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis. If the planned VCS project activity generates no financial or economic benefits other than VCS related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III). Note, that Options I, II and III are mutually exclusive hence, only one of them can be applied.

Outcome:

Given the barrier analysis identifies only one alternative land use scenario, it is not necessary to proceed with step 3.

Sub-step 3b. – Option II. Apply investment comparison analysis

Identify the financial indicator, such as IRR, NPV, payback period, cost benefit ratio most suitable for the project type and decision-making context.

Outcome:

Given the barrier analysis identifies only one alternative land use scenario, it is not necessary to proceed with step 3.

Sub-step 3c. Calculation and comparison of financial indicators (only applicable to options II and III)

Calculate the suitable financial indicator for the proposed VCS project activity without the financial benefits from the VCS and for all the land use scenarios that are not prevented by any barrier. Include all relevant costs (including, for example, the investment cost, the operations and maintenance costs), and revenues (excluding VCU revenues, but including subsidies/fiscal incentives where applicable), and, as appropriate, non-market cost and benefits in the case of public investors.

The following decision tree must be applied:

Is forestation without being registered as an A/R CDM project activity included in the list of land use scenarios that are not prevented by any barrier?

→ If yes, then: *Has the proposed A/R CDM project activity a less favourable financial indicator (e.g. IRR), than at least one land use scenario that is not prevented by any barrier?*

→ If yes, then select as the baseline scenario the land use scenario that allows for the highest value of the financial indicator (e.g. IRR).

Proceed to Sub-step 3d. Sensitivity analysis.

→ If no, then the proposed A/R CDM project activity is not additional.

→ If no, then: Select as the baseline scenario the land use scenario that allows for the highest financial indicator (e.g. IRR). Proceed to Sub-step 3d. Sensitivity analysis

Outcome:

Given the barrier analysis identifies only one alternative land use scenario, it would not be necessary to proceed with step 3.

STEP 4. Common Practice Analysis

Provide an analysis to which extent similar forestation activities to the one proposed as the VCS project activity have been implemented previously or are currently underway. Similar forestation activities are defined as that which are of similar scale, take place in a comparable environment, inter alia, with respect to the regulatory framework and are undertaken in the relevant geographical area, subject to further guidance by the underlying methodology. Other registered VCS project activities shall not to be included in this analysis. Provide documented evidence and, where relevant, quantitative information. Limit your considerations to any period since 31 December 1989.

If forestation activities similar to the proposed VCS project activity are identified, then compare the proposed project activity to the other similar forestation activities and assess whether there are essential distinctions between them. Essential distinctions may include a fundamental and verifiable change in circumstances under which the proposed VCS project activity will be implemented when compared to circumstances under which similar forestations were carried out. For example, barriers may exist, or promotional policies may have ended. If certain benefits rendered the similar forestation activities financially attractive (e.g., subsidies or other financial flows) explain, why the proposed VCS project activity cannot use the benefits. If applicable, explain why the similar forestation activities did not face barriers to which the proposed VCS project activity is subject.

Forestry plantation is not a common practice under the Mato Grosso do Sul state, given its small representativeness when land use is put into perspective. According to the last agricultural census, only 3,3% of the State area is dedicated to forest plantation, a small number when compared to cattle ranching and soy plantation, occupying 44,3% and 11% of the total area, respectively³².

The forestry activity is even more important when deforestation is put into perspective. Last year (2020), the city of Ribas do Rio Pardo, where the main portion of the project area is located, registered the second highest deforestation area of the state. This presents greater relevance considering that the state also has the highest deforestation rates under the Cerrado biome, which has been the second most impacted biome by deforestation in the country, with 33,5% of the deforested areas¹.

In the state of Mato Grosso do Sul there are two projects registered as ARR projects at the VCS database, these projects are in the municipalities of Costa Rica and Campo Grande and have the following similarity: being in the same state; having similar dimensions; being maintained by medium and small forest entrepreneurs.

Differently, The ARR Cerrado Carbon Project, will be implemented in a strategic location and can be described as a mega forestation project, with a proposed forestation area of 38,708 ha, surpassing by up to 35 times the total areas occupied by the A / R projects already registered in the state (the two projects add up to about 1,110.1 ha of forestation), therefore, The ARR Cerrado Carbon Project should be the largest AR project for the Cerrado biome³⁶.

Furthermore, Suzano is of one of the largest companies in the Brazilian forestry sector, an important differential when compared to the entrepreneur profile of the aforementioned ARR projects. This initiative may represent the establishment of a new level for ARR projects in Brazil.

It is important to highlight that the credit's revenue will allow for an unusual, assisted regeneration and enforced conservation of native vegetation on Legal Reserves (RL – Reservas legais, in Portuguese) and Permanent Protection Areas (APP – área de preservação permanente, in Portuguese), even though it is not accounted as emissions removals by the project. Although the forest code outlines that a percentage of the area must be preserved, the landowner is not forced to actively restore the area and is not a common practice at the region.

The project will implement two main additional activities for enhancing the native environment:

1. Ecological Restoration: The program's purpose is to restore the ecological processes, which are responsible for the formation of a functional and

³⁶ Verified Carbon Standard – Verra Registry. Please, search for Agriculture, Forestry and other land use at project type, AR-, Registered projects at Brazil. Available at: <<https://registry.verra.org/app/search/VCS>>. Last Access on 23 Nov. 2021

sustainable forest. The activities are implemented at Permanent Preservation Areas (APP – *Área de Preservação Permanente*, in Portuguese) and at Legal Reserves (RL – *Reservas Legais*, in Portuguese), going further the legal requirements of protecting such areas, promoting the revitalization of such areas. In addition, Suzano also developed a procedure to identify and characterize the different Phyto physiognomies of the Cerrado biome, in order to implement more assertive activities for restoration of the areas. The program is based on the assumptions for an integrated management at the landscape scale and contributes for the enhancement of biodiversity and environmental services at the region, with the application of the following methodologies: planting seedlings of regional native species, conducting natural regeneration, controlling invasive species and isolating protected areas with passive restoration. The most adequate technical choice depends on environmental conditions of the areas where such activities are implemented, considered the regeneration potential, the presence of degradation factors and its historic, and the verification of the development and results of activities that have already been implemented, through monitoring events. Suzano has committed to renew life and connect half a million hectares of prioritized areas for the conservation of biodiversity of the Cerrado, Atlantic Forest and Amazon biomes.

2. Environmental Monitoring: Suzano assesses the effect of its activities over the quality and quantity of hydrological resources, biodiversity, fauna and flora through a representative monitoring net, considered the scale and intensity of plantation activities, with pre-established periodicity, in order to better understand the impacts and implement new action plans, whenever deemed necessary.

This project will also enable the implementation of a series of social activities focused on meeting the needs of the communities surrounding the project.

In addition to the social activities already usually implemented by Suzano, either because it is a good practice, or to meet requirements to operate industrially nearby the project location, as defined by the PBA (Basic Environmental Plan), the credits revenue will enable the development of additional social activities to benefit the society surrounding the project areas.

The social projects to be developed under these three spheres are:

Social projects usually implemented for good practice:

- Suzano's Educational Program: dedicated to improving the quality of public education, through professional development of teachers and social participation focused on the students learning. This activity targets

educational managers, school managers, teachers, students and their parents, 3,648 people on average.

- Promotion Notices: investment and monitoring of social projects proposed by the civil community organizations for institutional strengthening of such groups, through initiatives interconnected with poverty and inequality reduction, Job and income creation and educational inclusion. This project targets up to 100 families
- Youth Movement: promotion of entrepreneurship in rural schools to encourage young people to stay in these rural areas. This project targets people from 16 to 29 years of age in vulnerability situations, a total of 60 families.
- Good Agent: Training of agents to prevent sexual violence against minors and elimination of violence against women, through sensitizing the project workforce and stakeholders. This project seeks to mitigate the impact caused by the industrial operation for the most vulnerable groups, and monitors the risk and occurrence of sexual violence against minors in the production, supply chain and society, benefiting 10.000 people directly and over 20.000 people indirectly
- First Job: This project helps technically preparing the youth for the market and alternative occupations, income generation and workforce qualification for labor and social inclusion, targeting 50 families.

Social projects developed to meet industry operational requirements by law:

- Ribas + Education: Offers Portuguese (native language) and math classes to those that did not have the opportunity to attend school at the conventional age, targeting 50 people on average
- Circular Economy – Waste Recovery Unit: Development of courses for recyclable material collectors and management organization of the selective collection system through the Municipal Plan to manage the solid residues, targeting 25 families. This project also includes the construction of an operational unit for solid waste sorting.
- Public Management Support Program: supports the local territorial development through the modernization of public management and territorial ordination, enabling partnerships, resources and training public managers. This project targets the whole community of Ribas do Rio Pardo, 24.996 people.

- + Water: This project supports local communities in obtaining clean water through semi-artesian well drilling. This project will support at least 400 families.
- Alternative Sanitation: implementation of evapotranspiration basins in rural family properties for better treating liquid and solid residues, in substitution of black pits. This project stops soil contamination and provides potable water, reduces health issues related to the lack of sanitation and counts with local community workforce, targeting at least 150 families.
- Healthy Smile: this project offers preventive or corrective oral health treatment for urban and rural communities in social vulnerability situation, with low or no access to such services, benefiting 180 families.

Social projects to be implemented due to credits revenue will be developed initially in an area of 39,002 ha, in addition to the project area:

- Honey Production: In this project, local apiarists receive support to implement new technologies, technical assistance in the production process and trainings for better management and product commercialization, in addition to promoting honey production inside the project area. Furthermore, a honey processing unit will be constructed at the city. This project targets 40 families.
- Circular Cerrado: This Project creates a new source of revenue for the local families through circular economy, where innovative economical activities that promote the biome conservation, such as functional food, biomaterials, circular fashion, sustainable extractivism, are encouraged. This project benefits 180 people.

Considered this is a grouped project and community needs may change with time, a few other projects can be implemented, such as, provided its adherence to the community profile:

- + Food: promotes agroforestry plantations at local family properties, teaching those families how to treat the land, improving the family income and quality of life, and improving the practices, making them more sustainable.
- Carbon Neutral Meat and Milk – Food reserve bank for dairy farming: construction of plats with grasslands to form a reserve bank and distribution of seedlings to families engaged on milk production, granting enough grassland to feed the animals during winter.
- Carbon Neutral Meat and Milk – Mobile Cow: improvement in dairy and meat production through improved access to specialized vets that conduct tests in milk quality and artificial insemination to improve herd's genetics.

- Carbon Neutral Meat and Milk - Silvipastoral Suzano: Implements the silvipastoral system at local rural properties that are suitable for forestry fomentation. In this activity, Suzano will reforest these areas in a way that cattle ranching can still be implemented, improving the sustainability of the activities developed and income of the families.
- Native Seedling Nursery: A nursery will be implemented for collecting and producing native seedlings from the Cerrado biome, in order to meet the needs for native regeneration and restoration, employing local workforce.

Such social and additional environmental activities are the greatest differential of the project, providing positive impacts whose magnitude is unprecedented for Suzano's activities. Even forestry projects previously implemented throughout the country in other biomes can't be compared to this project activity

Outcome:

In addition to eucalyptus plantation not being a common practice, in Mato Grosso do Sul State, additional activities will be implemented through the credit's revenue. In doing so, besides removing and reducing carbon emissions, the project will enrich fauna and flora biodiversity, provide a safe habitat to local fauna, recover degraded areas, improve the soil condition, and reduce its erosion, increase water retention, and protect water resources, and improve the microclimate of the region by making local temperatures milder. Furthermore, it will reduce rural exodus through the creation of more job opportunities for local community in areas of economical vulnerability, improve life quality and reduce forest degradation and deforestation in the region.

The project can be considered unique by the way it has been designed, associating social activities to the project activity itself. No other project can be deemed similar to this configuration, even those already implemented by the project proponents.

→ If Step 4 is satisfied, i.e. similar activities can be observed and essential distinctions between the proposed VCS project activity and similar activities cannot be made, then the proposed VCS project activity is not additional. Otherwise, the proposed VCS project activity is not the baseline scenario and, hence, it is additional.

No similar activity can be observed, this is not a common practice. The project is additional.

Outcome of “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities”

Step 0 provides the information to suffice the requirements for starting date of the Project Activity and previous consideration of credit's revenue.

Under Step 1, 3 alternative scenarios were identified: cattle ranching, soy farming and the execution of the project without the benefit of carbon credits, and Step 2 identifies that only the cattle ranching scenario would not be prevented by any barriers identified. Hence, step 3 was not needed for this additionality assessment.

No similar activity can be observed as determined by Step 4, proving this is not a common practice activity.

Thus, the project is additional.

3.6 Methodology Deviations

No methodology deviations were applied.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

This section will be completed for the VVB assessment and project registration

4.2 Project Emissions and Actual net GHG removals by sinks

This section will be completed for the VVB assessment and project registration

4.3 Leakage

This section will be completed for the VVB assessment and project registration

4.4 Net GHG Emission Reductions and Removals

This section will be completed for the VVB assessment and project registration



Project Description: VCS Version 4.1

5 MONITORING

This section will be completed for the VVB assessment and project registration

5.1 Data and Parameters Monitored

This section will be completed for the VVB assessment and project registration

5.2 Monitoring Plan

This section will be completed for the VVB assessment and project registration



Project Description: VCS Version 4.1

6 APPENDIX