

Social and Environmental Impact Assessment of Project Alpha

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PRESENTATION

This document presents the Environmental and Social Impact Assessment (ESIA) of Project Alpha. Project Alpha is located in the state of Mato Grosso do Sul, spanning across the municipalities of Camapuã, Figueirão, and Costa Rica.

Project Alpha encompasses approximately 24,119 hectares, utilized for livestock activities in recent decades. Through the reforestation strategy, this area is slated for restoration and tree planting for both the conservation and restoration of natural forests and commercial timber production.

The ESIA relied on secondary data and reports provided by the Timberland Investment Group (TIG), complemented by a field visit to assess the area. This document is structured into 17 chapters, outlined as follows:

1. Introduction
2. Project Justification
3. Policy, Legal and Admnistrative Framework
4. Project Description
5. Examanitation of Alternative
6. Definition of the Areas of Influence
7. Baseline Conditions in Area Potentially Affected by the Project
8. Potential Environmental, Social, Health and Safety Impacts
9. Analysis of Health and Safety Safety Standards and Risks
10. Analysis of the Environmental Risks Inherent in Implementation and Operation
11. Proposed Environmental and Social Prevention and Mitigation Measures
12. Environmental and Social Management and Monitoroing Framework
13. Prognosis
14. Assessment of Stakeholder Engagement and Information Dissemination
15. Conclusions
16. References
17. Annexes

Chapter 1 presents the introduction, general project details, enterprise specifics, and information about the consulting company.

Chapter 2 presents the primary economic, social, and environmental justifications for Project Alpha, considering its significance to the local and regional economy, as well as its impact on environmental recovery.

Chapter 3 presents and contextualizes relevant state and national legislation applicable to the intended activities at Project Alpha. It also examines the project's adherence to the current regulatory system and its alignment with federal, state, and municipal government plans and programs.

Chapter 4 provides a technical overview of the project, encompassing reforestation planting, which involves the replanting of trees in areas previously deforested, degraded, or altered, alongside silviculture planting. Silviculture focuses on cultivating trees primarily to yield wood products like timber, cellulose, or other forest products. This chapter assesses the required inputs, structures, access requirements, and labor necessary for establishing and subsequently managing operations at Project Alpha.

Chapter 5 describes the methodological procedures for studying: (i) locational alternatives, emphasizing support areas and land use restrictions; and (ii) technological alternatives and the operation of eucalyptus stands, encompassing planting techniques, input utilization, and agrochemical application.

Chapter 6 describes the areas of influence of the Physical, Biotic, and Socio-economic environments, taking into account the current panorama of Project Alpha, the characterization of the project, the intended panorama (post-implementation), as well as the characterization of the surrounding areas.

Chapter 7 delivers the diagnosis of the Physical, Biotic, and Socio-economic environments, drawing from the available secondary data and primary data collected during a technical visit, particularly focusing on the socio-economic aspect.

Chapter 8, grounded in the findings from Chapter 7, details the identification and evaluation of potential environmental impacts arising from significant aspects of reforestation and silviculture activities at Project Alpha. This evaluation encompasses environmental processes and tasks pertinent to both implementation and operation.

Chapter 9 outlines the potential risks associated with implementation and operation. It's essential to note the deliberate separation of environmental impacts and risks, as impacts stem from inherent and routine environmental tasks during project implementation and operation. Conversely, risks pertain to unforeseen accidents, malfunctions, or issues not typically anticipated during project implementation and operation.

Chapter 10, in turn, provides a summary of all regulatory standards and potential risks concerning Health and Safety, with specific emphasis on Project Alpha workers, establishing a correlation with Performance Standard 2.

Chapter 11 outlines the actions, guidelines, processes, and procedures designed for intrinsic control, aiming to eliminate or alleviate any environmental impacts resulting from the implementation and operation of Project Alpha. It's noteworthy that TIG already possesses a set of established procedures and guidelines for this purpose across other farms, which have been referenced and applied accordingly.

Chapter 12 introduces environmental plans and programs aimed at minimizing, mitigating, monitoring, enhancing (when beneficial), or compensating for the identified impacts.

Chapter 13 offers a prognosis for the study area, encompassing the current and future outlook for Project Alpha.

Chapter 14 provides a concise overview of stakeholders identified for reforestation and forestry activities. It also outlines the plan's strategies for engaging these interested parties.

Chapter 15 presents the conclusions drawn from the conducted studies regarding the environmental feasibility of the proposed activities at Project Alpha. It considers the outcomes of diagnostic studies, environmental impacts, minimizing and mitigation measures, and the environmental plans and programs outlined in this ESIA.

Chapter 16 details the research sources (references), following ABNT standards, utilized in crafting the ESIA.

Lastly, **Chapter 17** showcases the pertinent annexes related to the study.

Considering all IFC’s Performance Standards, the table below shows the relevant chapters where information can be found.

Table 1-1 – Correspondence between IFC's Performance Standards and the Chapters in this document

Performance Standards	Information available in
Assessment and Management of Environmental and Social Risks and Impacts	Chapter 4 Chapter 8 Chapter 9 Chapter 11 Chapter 12
Labour and Working Conditions	Chapter 4
Resource Efficiency and Pollution Prevention	Chapter 4 Chapter 11 Chapter 12
Community Health, Safety, and Security	Chapter 10
Land Acquisition and Involuntary Resettlement	Chapter 7
Biodiversity Conservation and Sustainable Management of Living Natural Resources	Chapter 7 Chapter 12
Indigenous Peoples	Chapter 7
Cultural Heritage	Chapter 7

1. INTRODUCTION

1.1. PROJECT INFORMATION

Project Alpha spans across 24,119 hectares, situated in the north/northeast region of the state of Mato Grosso do Sul, encompassing the municipalities of Figueirão, Costa Rica, and Camapuã.

Prior to the mid-1980s, Project Alpha boasted a significant expanse of native forest, with nearly all its land preserved. However, in the late 1980s and early 1990s, the native vegetation was gradually replaced by pasture areas. Since 1992, the use and occupation of the land at Project Alpha have hardly changed, maintaining a pasture matrix and preserving a portion as Legal Reserve.

Project Alpha aims to convert pasture areas (currently 17,151 hectares) into forest recovery areas (2,585 hectares) and forestry activity areas (14,566 hectares). This conversion will occur over approximately three years in planting stands. The restored native forest areas will be maintained, while the eucalyptus plantation areas will undergo cycles of planting, growth, harvesting, sale, and replanting.

1.2. IDENTIFICATION OF THE COMPANY RESPONSIBLE FOR THE ESIA

Tetra Tech is a diversified company boasting experienced professionals in research and development, environmental and socio-territorial planning and analysis, engineering, and information technology. Our strength lies in collectivity, excellence, and a track record of successful experiences in planning and managing sustainable projects. We prioritize fostering strong client relationships and delivering products and services of assured quality and safety, rooted in the application of the finest technical, scientific, and cost-effective solutions.

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1.3. TECHNICAL PERSONNEL

The technical team responsible for the preparation of this document is outlined below.

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Fábio Lemos	Forestry Engineer	Characterization of the Project, Study of Alternatives and Flora	CREA/PR 69239/D
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Matheus Fritzsons	Social Scientist	Socio-economic Coordination	-
Barbara Heleno	Social Analyst	Socio-economic Environment Team	-
Affonso Novello	Biologist	Applicable Legislation Coordination	CRBio 014578/01-D

1.4. COMPLIANCE WITH INTERNATIONAL STANDARDS

There is a concern to ensure compliance with all requests and guidelines from organizations to which the company is a signatory. This precaution aims to prevent any issues that might cause project interruptions. An evaluation was conducted to identify any outstanding or partially fulfilled requirements. This assessment warrants in-depth scrutiny to ensure adherence to all standards, guidelines, principles, and criteria. The analysis focused on documents recognized as being within the company's purview as a signatory:

- The Equator Principles EP 04, July 2020.
- IDB - Environmental and Social Policy Milestones – 2020.
- Paris Agreement.
- IFC Guidance Notes.
- FSC Standard - Assessment of Forest Plantations in the Federative Republic of Brazil: Harmonized Standard between Certifiers FSC-STD-BRA-01-2014 V1-1 EN.

The following are the criteria, indications and guidelines which, after initial assessment, are being implemented by the company. It's essential to highlight that these indications serve as guidelines rather than legal requirements or compliance measures. This approach ensures the sustainability of the entrepreneur without compromising it.

(A) Environmental licensing requirements for the project. It's well known that in the state of Mato Grosso do Sul, forestry is not classified as a potentially polluting activity. Consequently, forestry operations are not required to undergo an environmental licensing process. This circumstance has drawn more companies in the sector to the state, as they perceive it as an incentive for their business. However, upon analyzing the documents issued by the Equator Principles and the IDB, it is evident that the developer must comply with the legislation of the country in which the project is situated. Specifically, the relevant state legislation taken into account is State Law No. 1.253/1992 - the Environmental Code of the State of Mato Grosso do Sul. This law establishes guidelines and standards for environmental licensing in the state, encompassing regulations related to forestry. This law delineates the categories of ventures subject to licensing and outlines the prescribed procedures. It's crucial to highlight that this law exempts forestry activities from the environmental licensing requirement. Moreover, Federal Law No. 12.651/2012 (National Forest Code) explicitly states that obtaining a prior license for planting or reforesting with native or exotic forest species is unnecessary. This law was enacted subsequent to Federal Law No. 6.938/81 and CONAMA Resolution No. 237/97. Consequently, the latter two were repealed due to their incompatibility with subsequent legislation, as per Article 2, §1 of Decree-Law no. 4,657/1942. Hence, an evident contradiction arises between the regulations, as the subsequent law rendered the licensing requirement obsolete. Consequently, the previously mandated licensing directive was repealed due to its inconsistency with subsequent legislation. Specifically concerning CONAMA Resolution No. 237/97, apart from its temporal revocation, Federal Law No. 12.651/2012, given its higher hierarchy in the normative system, takes precedence over the Council's regulatory act, rendering environmental licensing unnecessary for forestry activities in the state of Mato Grosso do Sul. Thus, it is deemed that in instituting the exemption from licensing for forestry activities in the state of Mato Grosso do Sul, the competent bodies have adhered entirely to their legal obligations, operating within the scope of their authority and in alignment with the pertinent legislation. It's important to note that despite the exemption, compliance with all other legislation related to forestry remains imperative, in line with IFC’s Performance Standard 1.

(B) Dissemination of information about the project to interested parties (considering Performance Standards 5 and 6): The necessity to keep stakeholders informed about the project is underscored as a vital obligation in the Inter-American Development Bank (IDB), Principles of the Equator Principles, and International Finance Corportation (IFC) programs for ensuring the project's long-term sustainability. The company has initiated a communication program aligned with the requirements of the FSC® - Forest Stewardship Council® forest management standard, aiming to engage stakeholders effectively. Within this framework, the company actively maintains a network of relationships with individuals and groups within its operational area. To ensure effective communication, the company consistently engages with the community through social interviews in the Area of Direct Influence (ADI) to discern potential social impacts resulting from Project Alpha activities. Additionally, the company has established a dedicated social team responsible for managing communication throughout the phases preceding, during, and after these activities. This team informs stakeholders about the available communication channels. Project Alpha also has information boards and publicizes the main means of contact. The company's community relations network is designed to identify community leaders, serving as direct liaisons between the company and the community, fostering two-way communication. This approach aims to identify both positive and negative impacts while pursuing suitable compensatory measures when required. As part of this initiative, the company offers a public summary of the Project Alpha FSC Management Plan on its website. This accessibility ensures transparency, allowing all interested parties convenient access to pertinent information in a transparent and easily accessible manner. To enhance the current Corporate Communication Program, it's advisable to create and maintain information detailing the project's features, progress, and outcomes in a coherent and engaging manner throughout the project duration. Such disclosure fosters empathy among parties invested in the project, garnering support in resolving potential issues and conflicts. The entrepreneur should strategize to effectively convey information to stakeholders for maximum impact.

(C) The adherence of traditional communities to the company programs should be assessed. The company conducted a survey to ascertain the presence of traditional communities within the sphere of influence of Project Alpha plantations. The on-site field survey revealed the absence of traditional communities residing in areas influenced by the projects. Additionally, the plantations are not situated in proximity to indigenous lands or territories claimed by indigenous populations or traditional communities. However, within the indirect influence area, there exists a community named Santa Tereza, a Quilombola settlement established around 1901 (AGRAER, n.d.) within the boundaries of Figueirão municipality. This Quilombo received certification from the Palmares Cultural Foundation in 2005, published in the Federal Register on August 19th, 2005. The community's headquarters are approximately 10 kilometers from the boundaries of Project Alpha, although no descriptive record of its boundaries was found. According to Hoff *et al.* (2018), descendants of the initial settlers of the Santa Tereza quilombo reside across several properties in the region. The Santa Teresa community actively engages and participates in the company's social programs within the area. Several initiatives have been implemented to date, encompassing environmental awareness, healthcare programs, and projects fostering job creation and income generation. One notable initiative was the seed collection course conducted in Figueirão - MS municipality. This course aimed to educate the community to join the Cerrado Native Seed Network, prompted by the increasing demand for seeds in environmental restoration projects in the area. The initiative seeks to bolster the Santa Teresa community's capacity to contribute to ecological restoration endeavors, providing income-generating opportunities and advocating for the preservation of the Cerrado and its natural resources.

The interaction with indigenous, native, and quilombola communities is extensively highlighted in all the scrutinized regulatory documents, particularly in consideration of Performance Standard 7. These regulations emphasize the imperative for projects to uphold or enhance the living standards and cultural well-being of these communities, while respecting and acknowledging their existence and needs.

(D) The company must have a climate change resilience program. For the Inter-American Development Bank (IDB), it's imperative for entrepreneurs to comprehend the potential impacts of climate change on their operations. This understanding needs to be documented and presented, illustrating to financiers and stakeholders the measures being taken to ensure the business's viability in a climate different from the current one. According to a publication by the state of Mato Grosso do Sul (IMASUL, 2016), projections indicate an estimated temperature rise of up to 5.8°C between 2041 and 2070 in the state. This escalation is anticipated to result in increased water scarcity, particularly affecting activities reliant on river water, amplified severe weather events and heatwaves, a surge in forest fires, and heightened disease spread. Here, we underscore the connection between this aspect and Performance Standard 3, emphasizing its significance as a crucial topic requiring attention. In this document, the diagnosis incorporates data pertaining to climate change under section 7.1.1.2. It's important to note that the seedlings acquired by the company for commercial planting undergo genetic improvement. Through tree selection and crossbreeding to attain favorable traits, these seedlings inherit valuable characteristics. These attributes encompass rapid growth, resilience against pests and diseases, adaptability to diverse environmental conditions and climate variations, and advancements in wood quality.

(E) Environmental Management System (EMS). According to the IFC's Standards, any enterprise receiving funding is required to maintain a robust Environmental Management System, modeled after ISO 14001. The significance of such a system is underscored in Performance Standard 1, aimed at accurately identifying all environmental impacts linked to routine operational activities, along with associated risks. This globally recognized management system equips enterprises with tools for environmental management, enabling them to address both routine and emergency environmental demands effectively. The company has implemented an environmental management system aligned with the internationally recognized guidelines and standards set by the Forest Stewardship Council (FSC). This framework guarantees that the company's activities and operations adhere to sustainable forest management standards, fostering responsible practices and environmental preservation.

(F) Cumulative impacts assessment. This represents an IFC Guidance Standard for organizations to evaluate the cumulative impacts resulting from various activities. Examples of such cumulative impacts include the effect of truck traffic on soil and the potential consequences of repeated water abstraction on a body of water. The company's social and environmental management system, aligned with Forest Stewardship Council (FSC) standards, involves regular assessments and control measures to address potential cumulative environmental impacts. This process is an integral component of the management system, undergoing routine evaluations to detect any escalating impacts, allowing for measures to minimize or mitigate them. This encompasses evaluating the effects on water resources, including water abstraction, and the impacts on soil due to truck transportation operations. As previously mentioned, this item is also connected to Performance Standard 1. In Chapter 8 of this document, all impacts related to project implementation and operation are delineated, emphasizing their cumulative nature alongside other identified impacts.

(G) The company should know if there are any Payments for Environmental Services (PES) in the region. IFC recommends assessing the presence of Environmental Services Programs in the region of operation and understanding how Project Alpha's activities might influence the outcomes of Payment for Environmental Services, directly related to Performance Standard 6. The company conducted a survey encompassing potential points of interest within the Project Alpha region, spanning directly affected areas (DAA), areas of direct influence (ADI), and areas of indirect influence (AII). The survey aimed to evaluate potential impacts arising from activities in the region. This study identified significant points of interest for the region, notably the Taquarí and Sucuriú River's Environmental Protection Area (APA). However, it's important to note that these areas are situated more than 10 kilometers away from Project Alpha's area of influence.

(H) The Management Plan must protect endangered species. This aspect, akin to the previous one, is also directly associated with Performance Standard 6. The company possesses and implements programs aligned with the Forest Management Plan, aimed at conserving, enhancing, and safeguarding the existence of endemic, rare, threatened, or endangered species, along with their habitats, identified in surveys conducted within Project Alpha's boundaries. Adhering to the principles and criteria set forth by the Forest Stewardship Council (FSC) (6.2.2), it is crucial to undertake documented measures to safeguard these species, establishing specific programs for both flora and fauna. It's important to highlight that the company already conducts Monitoring Programs for both flora and fauna. The objective of this monitoring is to ascertain whether the land use conversion at Project Alpha is conducive to supporting endemic species, those facing extinction, and/or those acting as indicators of environmental quality. Additionally, this document outlines a Fauna as an Indicator of Environmental Quality Monitoring Program. The aim is to assess whether the land use conversion at Project Alpha will promote the well-being of endemic, endangered, and/or bioindicator species indicative of environmental quality.

(I) Long-term monitoring programs. Establishing monitoring programs for fauna, flora, and water resources enables the assessment of whether implemented measures yield positive outcomes. Organizing these results into a historical series helps demonstrate to stakeholders the progress achieved through the company's environmental protection initiatives, aligning with the principles outlined in Performance Standard 1. At Project Alpha, the company upholds biodiversity monitoring programs encompassing campaigns to monitor fauna (amphibians, reptiles, birds, mammals, and fish), along with flora. These programs primarily gather data to support forest management decisions, emphasizing the preservation of biodiversity. Moreover, the company has instituted a water resources monitoring program specifically designed to evaluate the impact of forest management practices on the surface water quality within Project Alpha's influenced areas. This monitoring adheres to predetermined objectives, indicators, and targets established to guide the activities. Regular analysis of the acquired results and diverse monitoring tools furnishes valuable insights for the ongoing enhancement of the company's forest management practices. These outcomes are compiled into a historical series and annually featured in the Public Summary of the Management Plan (FSC), accessible to everyone through the website. The primary goal is to communicate the progress achieved through the company's environmental protection endeavors to all interested parties.

(J) Procedures for chemical emergencies. The utilization of chemical products directly aligns with three IFC's Performance Standards. Firstly, it corresponds to Standard 1, as it necessitates the accurate description of the chemical products' usage, storage, transportation, and handling, along with outlining potential impacts and associated risks. Secondly, it pertains to Standard No. 3 due to the potential for these products to contribute to area contamination. Lastly, it is relevant to Standard 4, concerning the health and safety of nearby communities. At Project Alpha, the company has implemented the 'Emergency Preparedness and Response' (PG 006) management procedure to manage potential risks and emergencies associated with chemical product usage. The handling of these products adheres to safety standards, placing emphasis on safeguarding workers' health and preventing environmental impacts. The company implements suitable practices for storing and transporting chemical products across its managed properties, following requisite standards and techniques to mitigate risks and environmental impacts. The specific methodology for control, product selection, and dosages is determined through technical recommendations provided by the company team and continuous monitoring of the plantations. Adhering to the FSC's agrochemicals policy, the company has developed Environmental and Social Risk Analyses (ARAS/ESRA) for the utilization of agrochemicals. Potential emergency situations are identified through an assessment of environmental aspects, impacts, hazards, and risks, in compliance with the 'Identification of Aspects and Hazards and Assessment of Impacts and Risks' (PG 004) management procedure. Subsequent to emergency situations, operating procedures undergo comprehensive analysis and review to ascertain their appropriateness and efficacy. Furthermore, emergency procedures undergo regular testing through drills and simulations exercises.

(K) Procedures for the use of biological control agents. As noted in the preceding section, the utilization of biological control agents directly aligns with three IFC's Performance Standards. Firstly, it pertains to Standard 1, necessitating accurate descriptions of their usage, storage, transportation, and handling, along with outlining potential impacts and associated risks. Secondly, it corresponds to Standard 3, considering the potential for these agents to contribute to area contamination. Lastly, it is relevant to Standard 4, concerning the health and safety of nearby communities. The company employs biological control agents at Project Alpha when needed. This decision follows a survey conducted by IAGRO (Mato Grosso do Sul State's Animal and Plant Health Defense Agency) aimed at detecting, delimiting, and verifying pests. This action's objective is to validate the absence of forest pests in the state, contributing to the maintenance of the state's pest-free status recognized by the Ministry of Agriculture, Livestock, and Supply. This status allows products from the state to be transported across the country without health-related restrictions. In instances of pest identification, the company receives support from the Forest Protection Program (PROTEF) at the Institute of Forestry Research and Studies (IPEF). PROTEF is designed to foster integrated management of detrimental agents in forests. Its scope includes studies on insect pests, phytopathogens, and the incidence of fires, along with their impacts on the forest ecosystem. Moreover, PROTEF develops appropriate technologies and procedures for pest control, considering legal, technical, economic, social, and environmental factors.

2. PROJECT JUSTIFICATION

2.1. TECHNICAL AND ENVIRONMENTAL JUSTIFICATION

Companies are encouraged to use the development of a Social and Environmental Impact Assessment (ESIA) as part of the process required to secure government permits for implementing new investments and expanding existing operations globally.

With a primary focus on converting previously deforested land used for pasture into sustainable commercial plantations, the company expects that the development of an ESIA will provide additional benefits by meeting or exceeding the legal limits for protecting and restoring natural forests.

In this way, the ESIA will provide guidance for conducting environmental and social impact studies at Project Alpha. It will also aid in implementing environmental and social management plans as essential tools for identifying and assessing socio-environmental risks and benefits during the planning phase of this investment. These measures will involve incorporating risk mitigation strategies into the project's design.

The services covered by this ESIA were conducted in compliance with International Certification Standards. The assets are anticipated to be certified by the Forest Stewardship Council (FSC) and to adhere to the Performance Standards of the International Finance Corporation (IFC), in addition to meeting all requirements established by Brazilian legislation applicable to forestry.

This information therefore aims to fulfill the World Bank's recommendations for sustainable actions to be undertaken by the company as part of its contribution to the country's sustainable development. These actions encompass various topics addressed in the ESIA, such as CO_2 emissions, responsible use of fuels and raw materials, employee health and safety, and impacts on water and biodiversity.

2.2. ECONOMIC JUSTIFICATION

Considering the consolidation of Project Alpha's implementation and operation within the territory, potential benefits for the region come to light. The shift from cattle ranching to forestry holds promise for positively impacting local and regional development. This transition is poised to stimulate the local economy, leading to the creation of both direct and indirect jobs, alongside increased tax revenue.

While many workers may originate from other regions of the country, their presence in the area will contribute significantly to bolstering the local economy. Consequently, this influx could prompt enhancements in the region's service infrastructure and commerce. Although a comprehensive evaluation of these changes is pending, there exists substantial potential for Project Alpha's transition in activities to greatly benefit the region's development.

2.3. SOCIAL JUSTIFICATION

The potential benefits stemming from the implementation and operation of the project hold the promise of positively influencing the social dynamics of the affected municipalities. This would materialize through economic diversification in the region, the creation of job opportunities, local workforce training, and potentially, an enhancement in the quality of life and local infrastructure. It's important to note that these benefits haven't undergone full evaluation yet. Nevertheless, the transition from cattle ranching to forestry presents favorable prospects for the region's development.

3. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

The objective of this chapter is to present and contextualize the alignment of the company's planned forestry and native vegetation planting activities at Project Alpha with the pertinent legislation at federal, state, and municipal levels. This particularly encompasses socio-environmental restrictions within the territory and the socio-environmental parameters governing these activities. Additionally, it delves into the project's adherence to the existing regulatory framework and its compatibility with federal, state, and municipal government plans and programs.

The objective of this assessment is to showcase the alignment of the company's proposed activities with the existing regulatory system, affirming the absence of legal restrictions or impediments hindering their implementation and operation.

Following this, the discussion will focus on the legal framework and normative basis pertinent to the company's activities. This will include an exploration of the legal parameters safeguarding natural resources, land use, and occupation at federal, state, and municipal levels.

3.1. PRINCIPLES OF ENVIRONMENTAL LAW

3.1.1. Constitution of the Federative Republic of Brazil

The 1988 Federal Constitution (CF/88) allocated a dedicated chapter for environmental protection (Title VIII, Chapter VI of the Federal Constitution), guaranteeing the right to an ecologically balanced environment for all individuals. It imposes upon public authorities and the community the responsibility to defend and preserve it for both present and future generations.

Beyond the aforementioned chapter, the safeguarding of the environment is now regarded as a principle to be honored within economic development, aligning with the principles of sustainable development as outlined in Article 170 of the CF/88. This article stipulates that 'the economic order, founded on the appreciation of the value of human work and on free enterprise, is intended to ensure everyone a life with dignity, in accordance with the dictates of social justice,' while also emphasizing the defense of the environment among its guiding principles

The concept of ‘dignity of the human person,' not only serving as the foundation of the economic order but also identified as one of the fundamental principles of the Federative Republic of Brazil (Article 1, Item III of the CF/88), underscores the importance of environmental protection. This protection, enshrined in everyone's right to an ecologically balanced environment (Article 225 of the CF/88), serves as a guarantee of human dignity and forms a fundamental right. Thus, environmental licensing stands as a vital instrument for safeguarding this right and attaining the fundamental objectives of the Federative Republic of Brazil (Article 3 of the CF/88), which encompass guaranteeing national development, eradicating poverty and substandard living conditions, and reducing social and regional inequalities. Consequently, it's widely acknowledged that the Federal Constitution advocates development harmonized with respect for the environment.

3.1.2. National Environmental Policy (PNMA)

Law No. 6,938, of August 31st, 1981, outlines the National Environmental Policy (PNMA), specifying its aims, formulation, application mechanisms, and additional provisions. Its primary objectives are:

> *I - harmonize socio-economic development with the preservation of environmental quality and ecological balance;*
> *II - define priority areas for governmental action concerning ecological quality and balance, considering the interests of the Union, States, Federal District, Territories, and Municipalities;*
> *III - establish criteria and standards for environmental quality and regulations regarding the use and management of environmental resources;*
> *IV - develop national research and technologies focused on the rational use of environmental resources;*
> *V - disseminate environmental management technologies, share environmental data and information, and promote public awareness of the necessity to preserve environmental quality and ecological balance;*
> *VI - preserve and restore environmental resources to ensure their rational utilization and continuous availability, contributing to maintaining a conducive ecological balance for life;*
> *VII - impose on polluters and predators the obligation to restore and/or indemnify for the damages caused, and on users, the contribution for the utilization of environmental resources for economic purposes.*

The National Environmental System (Sisnama), established by Law No. 6,938/81, holds a pivotal role in environmental protection in Brazil. The National Environment Council (CONAMA) serves as its advisory and deliberative body, responsible for contributing to the definition of governmental environmental guidelines and policies

3.1.3. Environmental Licensing

Environmental licensing constitutes an administrative process conducted by the environmental regulatory bodies across the three levels of government whenever there is intent to establish an enterprise that either currently or potentially causes environmental degradation. It serves as a preventive measure, aimed at minimizing adverse impacts on the environment to the greatest extent possible within the realm of feasibility. Article 2, Item I of Complementary Law 140/11 precisely defines environmental licensing as 'the administrative procedure directed at licensing activities or ventures utilizing environmental resources, which actively or potentially pollute or have the capability, in any form, of causing environmental degradation.' This definition aligns with the regulation outlined in Federal Law No. 6,938/81:

CONAMA Resolution No. 237, of December 19th, 1997, which addresses the revision and supplementation of procedures and criteria utilized in environmental licensing—an instrument under the National Environmental Policy (PNMA)—sets forth in Article 10 that the environmental licensing procedure must adhere to the following stages:

- Definition by the competent environmental agency, with the entrepreneur's participation, of the documents, projects, and environmental studies necessary to initiate the licensing process corresponding to the license to be requested. In the state of Mato Grosso do Sul, this activity is exempt from the environmental licensing process, which must be carried out at the federal level (IBAMA);
- Application for the environmental license by the entrepreneur, accompanied by relevant documents, projects, and environmental studies, ensuring proper publicity;
- Analysis by the competent environmental agency, part of Sisnama, of the presented documents, projects, and environmental studies, including technical inspections when necessary;
- Request for clarifications and additions by the competent environmental agency resulting from public hearings, when applicable. There might be a reiteration of the request when the clarifications and additions were unsatisfactory;
- Issuance of a conclusive technical opinion and, when applicable, a legal opinion;
- Approval or rejection of the license application, ensuring proper publicity.

Moreover, in Article 8 of the aforementioned Resolution, public authorities are given the responsibility of issuing the following licenses:

> *Article 8: The Public Authority, in exercising its control competence, shall issue the following licenses:*
> *I - Preliminary License (LP) - granted in the preliminary phase of the planning of the enterprise or activity, approving its location and design, attesting to its environmental viability, and establishing the basic requirements and conditions to be met in the subsequent phases of its implementation;*
> *II - Installation License (LI) - authorizes the installation of the enterprise or activity in accordance with the specifications contained in the approved plans, programs, and projects, including environmental control measures and other conditions, which constitute the determining factor;*
> *III - Operation License (LO) - authorizes the operation of the activity or enterprise, after verifying the effective compliance with what is stated in the previous licenses, along with the environmental control measures and conditions determined for the operation.*
> *Sole Paragraph: Environmental licenses may be issued separately or successively, according to the nature, characteristics, and phase of the enterprise or activity.*

Annex 1 of the aforementioned Resolution - Activities or Undertakings Subject to Environmental Licensing - mentions **forestry** as an activity subject to environmental licensing. The detailing and supplementation of this Annex are the responsibilities of the competent environmental bodies. It's worth noting that the activity of planting native vegetation poses no pollution potential and, therefore, is exempt from environmental licensing.

As previously mentioned, in the state of Mato Grosso do Sul, forestry isn't classified as a potentially polluting activity, thus qualifying for exemption from the state's environmental licensing process.

Considering the pertinent state legislation, particularly State Law 1.253/1992 - the Environmental Code of the State of Mato Grosso do Sul, which outlines the guidelines and standards for environmental licensing within the state, including those pertinent to forestry. This law defines the categories of activities subject to licensing and the accompanying procedures. Notably, this legislation exempts forestry activities from environmental licensing requirements. Moreover, it's essential to highlight that Federal Law No. 12.651/2012 (Brazilian Forest Code) explicitly states that obtaining a prior license for planting or reforesting with native or exotic forest species is unnecessary. This law came into effect subsequent to Federal Law No. 6.938/81 and CONAMA Resolution 237/97. Consequently, the latter two were repealed to the extent of their incompatibility with subsequent legislation, as per Article 2, §1 of Decree-Law No. 4,657/1942. This resulted in an apparent contradiction between the regulations, as the later law eliminated the necessity for licensing. Consequently, the previously mandated licensing directive was nullified due to its incongruity with subsequent laws. Particularly concerning CONAMA Resolution 237/97, apart from the temporal revocation, Federal Law 12.651/2012, due to its superior hierarchy within the normative system, takes precedence over the Council's regulatory act, rendering environmental licensing unnecessary for forestry activities in the state of Mato Grosso do Sul. Hence, it is considered that by establishing the exemption from licensing for forestry in Mato Grosso do Sul, the competent authorities have fully adhered to their legal obligations, operating within their jurisdiction and in alignment with the relevant legislation.

At the state level, Law No. 3.839/09 establishes the Mato Grosso do Sul State Territorial Management Program (PGT/MS) and approves the First Approximation of the Ecological-Economic Zoning of the state of Mato Grosso do Sul (ZEE/MS). Additionally, Law No. 2.257/01 outlines the guidelines for state environmental licensing and establishes deadlines for issuing Environmental Licenses and Authorizations. These responsibilities fall under the purview of the environmental agency of the state of Mato Grosso do Sul (IMASUL).

3.1.4. Environmental Impact Assessment (EIA)

The Environmental Impact Assessment (EIA) is regarded as one of the instruments of the PNMA - National Environmental Policy, with its fundamental criteria and general guidelines outlined in CONAMA Resolution No. 01/86. Article 2 identifies forestry (the economic exploitation of wood or firewood) as an activity that alters the environment. Hence, the initiation of the environmental licensing process for such activities necessitates the preparation of an Environmental Impact Assessment (EIA) and an Environmental Impact Report (RIMA):

> *Article 2 - The licensing of activities that alter the environment, such as:*
> *(...)*
> *XIV - Economic exploitation of wood or firewood, whether in areas exceeding 100 hectares or smaller stands, provided it extends to significant areas either in percentage terms or in terms of environmental importance.;*
> *(...)*

3.1.5. Feasible Environmental Assessments

To analyze the application for a prior environmental license, the entrepreneur must submit the necessary and appropriate environmental study to the government. This study serves as the tool responsible for connecting the assessment of environmental impacts to licensing, essentially providing the groundwork for evaluating the environmental viability of activities and/or undertakings.

Environmental assessments are defined as 'any and all studies related to the environmental aspects concerning the siting, installation, operation, and expansion of an activity or undertaking, submitted as a support for the analysis of the required license' (Article 1, Item III, 1st part of CONAMA Resolution No. 237/97). The necessity for a particular study is determined based on the significance of the environmental impact that the activity may impose on the environment.

In this context, the Sole Paragraph of Article 3 in CONAMA Resolution 237/97 stipulates: 'The competent environmental body, upon confirming that the activity or undertaking does not potentially cause significant environmental degradation, will specify the relevant environmental studies for the respective licensing process.' Hence, the environmental agency reserves the right to request specific tools for assessing environmental impacts.

3.2. LEGAL FRAMEWORK FOR NATURAL RESOURCES AND CULTURAL HERITAGE

This section will address the federal, state, and municipal environmental legislation relevant to the conservation and utilization of natural and socio-environmental resources within the scope of the company's forestry operations at Project Alpha, encompassing the municipalities of Camapuã, Figueirão, and Costa Rica in the state of Mato Grosso do Sul.

3.2.1. Biodiversity

The Convention on Biological Diversity (CBD) aims at the conservation and sustainable use of biodiversity and the fair and equitable sharing of the benefits arising from its use, recognizing associated traditional knowledge. Upon ratifying the Convention in 1994, the Brazilian government enacted Decree No. 1,354, of December 29th, 1994, establishing the National Biological Diversity Program (Pronabio). The program is geared toward executing the essential actions to fulfill Brazil's commitments under the CBD.

Through Decree No. 4,339, of August 22nd, 2002, Brazil's Ministry of the Environment (MMA) assumed the coordination of the National Biodiversity Policy, drawing inspiration from the principles and guidelines outlined in the CBD. As the national coordinator of this policy, the Ministry shoulders the responsibility of fostering agreements and collaborations among public authorities and diverse societal sectors. Its objective is to generate knowledge, facilitate the development of natural capital assets, and ensure the preservation of Brazilian biodiversity, the sustainable utilization of its elements, and the equitable sharing of benefits arising from these endeavors.

Article 1 of the Decree establishes principles and guidelines for the implementation of the National Biodiversity Policy:

> *Article 1 - The principles and guidelines for the implementation of the National Biodiversity Policy, as outlined in the Annex to this Decree, are hereby established, ensuring the participation of the federal, district, state, and municipal governments, as well as civil society.*

Additionally, Item 2 of the Annex in the aforementioned Decree specifies:

> *2. The National Biodiversity Policy will be governed by the following principles:*
>
> *I - biological diversity has intrinsic value, deserving respect regardless of its value to man or potential for human use;*
>
> *II - nations have the sovereign right to exploit their own biological resources, in accordance with their environmental and development policies;*
>
> *III - nations are responsible for the conservation of their biodiversity and for ensuring that activities under their jurisdiction or control do not cause harm to the environment and biodiversity of other nations or of areas beyond the limits of national jurisdiction;*
>
> *IV - the conservation and sustainable use of biodiversity is a common concern for humanity, but with differentiated responsibilities, with developed countries being responsible for providing new and additional financial resources and facilitating adequate access to the relevant technologies to meet the needs of developing countries;*
>
> *V - everyone has the right to an ecologically balanced environment, which is a common good and essential to a healthy quality of life, and the public authorities and the community have a duty to defend and preserve it for present and future generations;*
>
> *VI - soil, water and biological resource management objectives are a matter of societal choice and should involve all relevant sectors of society and all scientific disciplines and consider all relevant forms of information, including scientific, traditional and local knowledge, innovations and customs;*
>
> *VII - the maintenance of biodiversity is essential for the evolution and maintenance of the systems necessary for life in the biosphere and, to this end, it is necessary to guarantee and promote the capacity of organisms to reproduce sexually and interbreed;*
>
> *VIII - where there is consistent scientific evidence of a serious and irreversible risk to biological diversity, the Government shall determine cost-effective measures to prevent environmental degradation;*

IX - the internalization of environmental costs and the use of economic instruments will be promoted taking into account the principle that the polluter should, in principle, bear the cost of pollution, with due respect for the public interest and without distorting international trade and investment;

X - the installation of a work or activity that potentially causes significant environmental degradation must be preceded by a prior Environmental Impact Assessment, which will be made public;

XI - Man is part of nature and has been present in the different Brazilian ecosystems for more than ten thousand years, and all these ecosystems have been and are being altered by him to a greater or lesser extent;

XII - the maintenance of national cultural diversity is important for the plurality of values in society in relation to biodiversity, with indigenous peoples, quilombolas and other local communities playing an important role in the conservation and sustainable use of Brazilian biodiversity;

XIII - actions related to access to traditional knowledge associated with biodiversity must be carried out with the prior informed consent of indigenous peoples, quilombolas and other local communities;

XIV - the use value of biodiversity is determined by cultural values and includes direct and indirect use value, the option of future use and also intrinsic value, including ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values;

XV - the conservation and sustainable use of biodiversity must contribute to economic and social development and the eradication of poverty;

XVI - the management of ecosystems should seek an appropriate balance between the conservation and sustainable use of biodiversity, and ecosystems should be managed within the limits of their functioning;

XVII - ecosystems must be understood and managed in an economic context, with the aim of:

a) reduce market distortions that negatively affect biodiversity;

b) promote incentives for the conservation of biodiversity and its sustainable use; and

c) internalize costs and benefits in a given ecosystem as much as possible;

> *XVIII - research, ex situ conservation and adding value to components of Brazilian biodiversity should preferably be carried out in the country, and international cooperation initiatives are welcome, respecting national interests and coordination;*
>
> *XIX - national biodiversity management actions must establish synergies and integrated actions with international conventions, treaties and agreements related to biodiversity management; and*
>
> *XX - biodiversity management actions will be integrated, decentralized and participatory, allowing all sectors of Brazilian society to effectively access the benefits generated by its use.*

Another noteworthy aspect of Federal Decree No. 4,339/02 is Component 4 - Monitoring, Evaluation, Prevention, and Mitigation of Impacts on Biodiversity. One of its specific objectives is to aid zoning actions and identify critical areas, by river basin, for biodiversity and water resource conservation. Moreover, it aims to facilitate impact studies on biodiversity across various river basins, particularly in riparian forests, headwaters, waterholes, and other designated areas for water resource conservation.

Through Decree No. 4,703, of May 21st, 2003, the Brazilian government incorporated Pronabio into the framework for executing the National Biodiversity Policy. Additionally, it established the National Biodiversity Commission (Conabio) as the coordinating body responsible for these actions, collaborating with other members of the Commission.

Conabio was established by Decree No. 10,235, of February 11th, 2020. It comprises representatives from government bodies and civil society organizations, playing an important role in discussing, proposing, and implementing national biodiversity policies within their respective domains. This Commission bears the responsibility of advancing Brazil's commitments to the CBD, along with identifying and suggesting priority areas and strategies for research, conservation, and sustainable utilization of biodiversity elements.

Law No. 13,123/15 regulates Article 225, Paragraph 4, and Paragraph 1, Item II, of the Federal Constitution; and also Article 1, Article 8, Paragraph ‘j’, Article 10, Paragraph ‘c’, Article 15, and Article 16, Items 3 and 4 of the Convention on Biological Diversity (promulgated by Decree No. 2,519/98). This law addresses genetic heritage access, protection of and access to associated traditional knowledge, and benefit-sharing for conserving and sustainably utilizing biodiversity. Additionally, it repeals Provisional Presidential Decree No. 2,186-16, of August 23rd, 2001.

3.2.2. Conservation Unit (UC)

The creation of Conservation Units (UCs) is provided for in the Federal Constitution of 1988 (Chapter VI, Article 225, Paragraph 1, Item III), which stipulates that the Government is responsible for defining, ‘in all units of the Federation, territorial spaces and their components which are to receive special protection, any alterations and suppressions being allowed only by means of law, and any use which may harm the integrity of the attributes which justify their protection being forbidden.’

Federal Law No. 9.985/00, regulated by Federal Decree No. 4.340/02, established the National System of Conservation Units (SNUC). This legislation is applicable to future environmental licensing processes for the company's forestry activities.

According to Article 2, Section I, of the aforementioned regulation, Conservation Units (UCs) can be described as ‘territorial spaces encompassing environmental resources, including jurisdictional waters, possessing significant natural characteristics. These areas are legally established by the Government, delineated by specific boundaries, and operate under a special administration regime. They are aimed at conservation objectives and benefit from adequate protection guarantees.’ Conservation Units are typically categorized into two groups: (i) Full Protection Units and (ii) Sustainable Use Units.

The objective of the Sustainable Use Units is to reconcile nature conservation with the sustainable utilization of some of its natural resources (Article 7, §1). Among these Units are the following Conservation Units (UCs): Environmental Protection Area (APA), Area of Relevant Ecological Interest (ARIE), National Forest (FLONA), Extractive Reserve (RESEX), Fauna Reserve (RF), Sustainable Development Reserve (RDS), and Private Natural Heritage Reserve (RPPN) (Article 14).

Conversely, Full Protection Units are designed to maintain the integrity of nature, permitting only indirect utilization of its natural resources (Article 7, §2). These units are subdivided into specific modalities outlined in Article 8 of the aforementioned Law: Ecological Station (ESEC), Biological Reserve (REBIO), National Park (PARNA), State Park (PE), Natural Monument (MONA), and Wildlife Refuge (REVIS).

Specific categories of conservation areas include a designated area in their management plans known as the Buffer Zone (BZ). Its primary function is to minimize and mitigate adverse impacts, acting as a perimeter surrounding the conservation area where human activities are governed by specific regulations and limitations.

For this study, Project Alpha and its vicinity underwent analysis to identify legally protected areas or regions deemed significant for conservation purposes. Within a 3 km radius from its boundaries, no protected areas were identified (CONAMA Resolution 428/10). The closest protected area is the Fazenda Lagoa Private Natural Heritage Reserve (RPPN), situated approximately 18 km away, also located in the municipality of Camapuã/MS. This reserve was established by Semagro Resolution No. 644/17, encompassing 150 hectares within a larger 1,337.98-hectare property owned by Caeté Florestal S.A. The RPPN serves the purposes of protection/conservation, environmental education, scientific research, visitation, and the recovery of degraded areas.

At the state level, Law No. 4,622, of December 24th, 2014, officially approves the allocation of funds derived from Environmental Compensation for Conservation Units and their respective buffer zones. These allocations are subject to the conditions ratified by the Environmental Compensation Chamber of IMASUL.

3.2.3. Priority Areas for Conservation (APC)

The Priority Areas for the Conservation, Sustainable Use, and Benefit Sharing of Biodiversity (APC) serve as a public policy instrument facilitating objective and participatory decision-making in planning and executing various actions, including the establishment of conservation units, licensing, inspection, and the promotion of sustainable practices. The regulations for identifying these Priority Areas and Actions were formally established by Decree No. 5,092/04, falling under the jurisdiction of the Ministry of the Environment (MMA).

Updating the Priority Areas and Actions remains a top priority for the MMA, aligning with strategies recommended by the Convention on Biological Diversity (CBD), the Action Plan for Implementing the National Biodiversity Policy (PAN-Bio) sanctioned during the 9th Extraordinary Meeting (CONABIO Resolution No. 40, of July 2nd, 2006), and the National Protected Areas Plan (PNAP) established by Decree No. 5,758/06. This effort is fueled by the availability of new data, information, and tools.

The responsibility falls upon the MMA to furnish the necessary means and instruments essential for updating the Priority Areas and Actions. This ensures societal involvement and attaining the desired outcome, which ought to mirror decisions taken in participatory workshops, utilizing databases compiled during this process as a foundation. The rules for identifying such Priority Areas and Actions were formally established by Decree No. 5.092, of May 21, 2004, within the scope of the MMA's attributions.

The degree of priority consists of five categories: (i) Extremely High Priority; (ii) Very High Priority; (iii) High Priority; (iv) Insufficiently Known; and (v) New Areas Identified. The first three categories denote the level of significance these areas hold for conserving biome biodiversity, while the last two indicate the lack of sufficient data to ascertain priority, even though they are areas of biological interest.

The Priority Areas and Actions for the Conservation, Sustainable Use, and Benefit Sharing of Biodiversity (APC) serve as a public policy instrument aimed at planning and executing suitable measures for conserving, recovering, and sustainably utilizing ecosystems. Following the determination of these areas, initiatives are undertaken, encompassing actions such as establishing conservation units (UCs), applying for licenses for potentially polluting activities, conducting inspections, promoting sustainable use, and ensuring environmental compliance.

At Project Alpha, there is no designated APC, but its vicinity, along with a small portion within the indirect influence area, intersects with the established APC 240, classified as 'High Priority'. Additionally, there are two neighboring areas under 'Very High Priority' (APC 245) and 'Extremely High Priority' (APC 235) categories. The latter encompasses part of the territory belonging to Emas National Park.

3.2.4. Biological Reserve (REBIO)

There is no Biological Reserve (REBIO) established within the areas of influence surrounding Project Alpha. The two nearest established REBIOs are over 300 kilometers away and are associated with the REBIO zones linked to the Pantanal Biome.

3.2.5. Flora

The Forestry Law (Law No. 12,651/12), which replaced the 1965 Forestry Code, addresses the preservation of native vegetation and outlines several noteworthy regulations, including the following:

> *Article. 3. For the purposes of this Law, the following definitions shall apply:*
> *I - Legal Amazon: the states of Acre, Pará, Amazonas, Roraima, Rondônia, Amapá and Mato Grosso and the regions situated to the north of the 13° S parallel, in the states of Tocantins and Goiás, and to the west of the 44° W meridian, in the state of Maranhão;*
> *II - Permanent Preservation Area - APP: a protected area, whether or not covered by native vegetation, with the environmental function of preserving water resources, the landscape, geological stability and biodiversity, facilitating the gene flow of fauna and flora, protecting the soil and ensuring the well-being of human populations;*
> *III - Legal Reserve: an area located within a rural property or possession, delimited in accordance with Article 12, with the function of ensuring the sustainable economic use of the rural property's natural resources, assisting the conservation and rehabilitation of ecological processes and promoting the conservation of biodiversity, as well as the shelter and protection of wild fauna and native flora;*
> *(...)*
> *VI - Alternative land use: replacing native vegetation and successor formations with other land cover, such as agricultural, industrial, power generation and transmission, mining and transportation activities, urban settlements or other forms of human occupation;*
> *VII - Sustainable management: the administration of natural vegetation in order to obtain economic, social and environmental benefits, respecting the support mechanisms of the ecosystem being managed and considering, cumulatively or alternatively, the use of multiple timber or non-timber species, multiple flora products and by-products, as well as the use of other goods and services;*
> *(...)*

IBAMA Normative Instruction No. 04/11 establishes procedures for preparing a Degraded Area Recovery Plan (PRADA), for the purposes of complying with environmental legislation, defining in its Article 4 that:

> *Article 4. For the purposes of this Normative Instruction, the following are considered:*
> *I - degraded area: an area unable to naturally return to an ecosystem that resembles a previously known state, or to another state that could be expected;*
> *II - altered or disturbed area: an area which, after the impact, still retains the means for biotic regeneration, i.e. has the capacity for natural regeneration;*
> *III - recovery: restitution of a degraded ecosystem or wild population to an undegraded condition, which may be different from its original condition, according to Article 1 of the Law on the Conservation of Nature, item XIII, of Law No. 9,985, of July 18th, 2000;*
> *IV - agroforestry system - SAF: a form of land use in which perennial woody species are cultivated in conjunction with herbaceous species or animals, in order to obtain the benefits of the resulting ecological and economic interactions;*
> *V - exotic species: species not native to the biome in which it occurs in a given geographical area, i.e. any species outside its natural geographical distribution area;*
> *VI - problem species or invasive species: exotic or native species that form populations outside their system of natural occurrence or that exceed the desirable population size, respectively, negatively interfering with the development of ecosystem recovery;*
> *VII - endangered species: a species that is in danger of extinction and whose survival is uncertain if the factors causing this threat continue to act, and which is on official lists of endangered species;*
> *VIII - pioneer and late species: the first ecological group includes pioneer and early secondary species, while the second includes late secondary and climax species;*
> *IX - zoochoric species: plant species dispersed by fauna*.

It is also worth mentioning that MMA Ordinance No. 148/22 updates the 'Official National List of Flora Species Threatened with Extinction'.

At the state level, Law No. 4,163, of January 2nd, 2012, regulates the exploitation of forests and other forms of native vegetation, the use of forest raw materials, and the obligation to replenish forests.

3.2.6. Fauna

Article 1 of Federal Law No. 5,197/67 provides for the protection of fauna:

> *Article 1. Animals of any species, at any stage of their development and living naturally outside captivity, constituting wild fauna, as well as their nests, shelters and natural breeding grounds are state property, and their use, persecution, destruction, hunting or gathering is prohibited.*

Federal Law No. 7,653/88 introduces changes to the aforementioned Federal Law in the area of fauna protection.

The National Fauna Protection Council (CNPF), created by Decree 97,633 of April 10th, 1989, aims to study and propose general guidelines for:

> *I – the creation and implementation of Reserves and Protected Areas, Parks and Hunting Reserves, and Recreational Areas;*
> *II – the proper wildlife management;*
> *III – subjects of specific interest submitted by the President of the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA).*

Within the scope of this issue, IBAMA, through its Normative Instruction No. 146/07, establishes the criteria for procedures relating to the management of wild fauna in areas of influence of undertakings and activities considered to be effectively or potentially causing impacts on fauna subject to environmental licensing.

IBAMA Normative Instruction 08/17 delineates the procedures for requesting and issuing Authorizations for the Capture, Collection and Transport of Biological Material (Abio) within the realm of federal environmental licensing processes.

At the state level, Law No. 5,673 of June 8th, 2021 provides for the protection of fauna in the state of Mato Grosso do Sul. Additionally, Law 1,488, of May 3rd, 1994, grants tax incentives for reforestation, while Law 1,458, of December 14th, 1993, provides for forest replacement in the state of Mato Grosso do Sul.

3.2.7. Specially Protected Territorial Areas

Article 225, Paragraph 1, Item III of the 1988 Federal Constitution stipulates that alterations to the boundaries or suppression of specially protected territorial spaces are only permissible through legal means. Any use that undermines the attributes justifying their protection is strictly prohibited. Additionally, Paragraph IV mandates that public authorities, in compliance with the law, must demand prior environmental impact studies for the installation of projects or activities that might result in significant environmental degradation.

Law No. 6,902, enacted on April 27th, 1981, establishes the creation of Ecological Stations and Environmental Protection Areas. Additionally, Law No. 6,938, of August 31st, 1981, outlines the National Environmental Policy, including its objectives, formulation, application mechanisms, and other provisions previously referenced in this report.

These laws are regulated by Decree No. 99,274, of June 6th, 1990. The text of Article 1 of this decree is provided below:

Art. 1. In the implementation of the National Environmental Policy, the Public Power, at its different levels of government, must:

> *I - Maintain permanent supervision of environmental resources, with a view to making economic development compatible with the protection of the environment and ecological balance;*
> *II - Protect areas that are representative of ecosystems by setting up conservation and ecological preservation units;*
> *III - Maintain, through specialized Public Administration bodies, permanent control of potentially or effectively polluting activities, in order to make them compatible with current environmental protection criteria;*
> *IV - Encourage the study and research of technologies for the rational use and protection of environmental resources, using regional or sectoral industrial and agricultural development plans and programs to this end;*
> *V - Implement a permanent system for monitoring local environmental quality indices in critical pollution areas;*
> *VI - Identify and inform the bodies and entities of the National Environmental System of the existence of degraded areas or areas threatened with degradation, proposing measures for their recovery; and*

VII - Guide education, at all levels, towards the active participation of citizens and the community in the defense of the environment, taking care that the school curricula of the various compulsory subjects include the study of ecology.

Federal Law No. 9,985, of July 18th, 2000, regulates Article 225, Paragraph 1, Items I, II, III, and VII of the Federal Constitution. This law establishes the National System of Nature Conservation Units, comprising two main groups: (i) Full Protection Units and (ii) Sustainable Use Units.

Exceptional cases allowing intervention or vegetation suppression in a Permanent Preservation Area (APP) due to public utility, social interest, or low environmental impact are specified in CONAMA Resolution No. 369/06

3.2.8. Water Resources

The Brazilian Water Code Act established by Decree No. 24,643, of July 10th, 1934, outlines rules in Articles 2 to 6, which include the following provisions:

Article 2: The following are public waters for common use:
a) Territorial seas, including bays, gulfs, inlets, and ports;
b) Navigable or floatable rivers, channels, lakes, and lagoons;
c) The tributaries that feed these waters;
d) Public springs and reservoirs;
e) Significant springs that constitute the "headwaters" on their own;
f) The arms of any public waterways, provided they influence navigability or floatability.
Paragraph 1: A navigable or floatable waterway is considered to be created by another when it becomes navigable shortly after being fed by that other waterway.
Paragraph 2: The tributaries that feed navigable or floatable lakes and lagoons shall be determined by expert examination.
Paragraph 3: Lakes or lagoons located on a single private property and exclusively enclosed by it are not included in item b of this article if they are not fed by any common waterway.
Article 3: The perenniality of water is an essential condition for it to be considered public, according to the previous article.

Sole Paragraph: However, for the purposes of this Code, waters that dry up during a severe drought shall still be considered perennial.

Article 4: A waterway considered public under item b of Article 2 does not lose this status if it becomes unnavigable or unfloatable in some or several of its stretches.

Article 5: All waters located in areas periodically affected by droughts shall still be considered public for common use, in accordance with the relevant legislation.

Article 6: Waters located on lands that are also public domain shall be considered public on Sundays when they are not part of the public domain for common use or are not common waters.

Law No. 9984, of July 17th, 2000, establishes the creation of Brazil's National Water and Sanitation Agency (ANA) tasked with implementing the National Water Resources Policy as part of the National Water Resources Management System.

The National Water Resources Council (CNRH), regulated by Decree No. 10,000, of September 3rd, 2019, holds the responsibility, in accordance with Article 2 of Law No. 9,984/2000, of coordinating national, regional, state, and sectoral plans developed by entities within the National Water Resources Management System. Additionally, it formulates the National Water Resources Policy in compliance with the regulations specified in Law No. 9,433 of January 8th, 1997. Within its jurisdiction, the CNRH issues Resolutions as per its authority:

- CNRH Resolution No. 15 of January 11th, 2001 - Establishes general guidelines for groundwater management.
- CNRH Resolution No. 16, of May 8th, 2001 - Establishes general criteria for granting the right to use water resources.
- CNRH Resolution No. 29, of December 11th, 2002 - Defines guidelines for granting the use of water resources for the exploitation of mineral resources.
- CNRH Resolution No. 58, of January 30th, 2006 - Approves the National Water Resources Plan and makes other provisions.
- CNRH Resolution No. 65, of December 7th, 2006 - Establishes guidelines for linking the procedures for obtaining the right to use water resources with environmental licensing procedures.
- CNRH Resolution No. 91, of November 5th, 2008 - Provides for general procedures for the classification of surface and groundwater bodies.

- CNRH Resolution No. 92 of November 5th, 2008 - Establishes general criteria and procedures for the protection and conservation of groundwater in Brazil.

Brazil's National Water and Sanitation Agency (ANA) establishes the general conditions for preventive water rights granting and usage within the Union's domain through ANA Resolution No. 1,941/17. Additionally, it outlines criteria for defining insignificant derivations, abstractions, effluent releases, and various interferences in Union-owned water bodies not requiring specific permissions, as per ANA Resolution No. 1,940/17.

At the state level, Law No. 2406 of January 29th, 2002, which institutes the State Water Resources Policy (PERH) and creates the State Water Resources Management System (SEGRH), and Law No. 3183 of February 21st, 2006, which provides for the administration, protection and conservation of groundwater in the state's domain, and which provides for the conservation of groundwater in the state's domain, are noteworthy.

3.2.9. Solid Waste

Activities that generate solid waste must meet the requirements established by Federal Law No. 12,305/10, which establishes the National Solid Waste Policy (PNRS), and by Federal Decree No. 10.936/22, which regulates the PNRS.

Federal Law No. 12,305/10, establishing the PNRS, provides the definition of solid waste in Article 3:

> *(...)*
> *XVI - solid waste: discarded material, substance, object or good resulting from human activities in society, the final disposal of which is carried out, proposed to be carried out or is obliged to be carried out, in solid or semi-solid form, as well as gases contained in containers and liquids whose particularities make it unfeasible to discharge them into the public sewage system or bodies of water, or require solutions that are technically or economically unfeasible in view of the best available technology;*
> *(...)*

CONAMA Resolution No. 313/02 outlines the provisions for the National Inventory of Solid Industrial Waste. Additionally, Decree No. 5,098, dated June 3rd, 2004, establishes the National Plan for Prevention, Preparedness, and Rapid Response to Environmental Emergencies with Hazardous Chemicals (P2R2). Moreover, Law No. 12,305, of August 2nd, 2010, establishes the National Solid Waste Policy, and the provisions of Articles 4 and 5 are reproduced below:

> *(...)*
> *Article 4. The National Solid Waste Policy brings together the set of principles, objectives, instruments, guidelines, targets and actions adopted by the Federal Government, alone or in cooperation with States, the Federal District, Municipalities or private individuals, with a view to the integrated management and environmentally appropriate management of solid waste.*
> *Art. 5. the National Solid Waste Policy is part of the National Environmental Policy and is articulated with the National Environmental Education Policy, regulated by Law No. 9,795, of April 27th, 1999, with the Federal Basic Sanitation Policy, regulated by Law No. 11,445, of 2007, and with Law No. 11,107, of April 6th, 2005.*
> *(...)*

The current Decree No. 10,936, of January 12th, 2022, has replaced Decree No. 7,404, of December 23rd, 2010, which previously regulated Law No. 12,305/2010, instituting the National Solid Waste Policy.

Conama Resolution 275/01 establishes the color code system for various types of waste, which is utilized to identify containers and transporters.

Regarding the Technical Standards developed by the Brazilian Association of Technical Standards (ABNT) applicable to the activity, it is worth highlighting the following Brazilian Standards (NBR):

- NBR 1183:1988 (reprinted by NBR 12.235:1992) - Storage of hazardous solid waste;
- NBR 1264:1989 (reprinted by NBR 11.174:1990) - Storage of waste classes II - non-inert and III - inert;
- NBR 7229:1997 - Design, construction and operation of septic tank systems;
- NBR 13969:97 - Septic tanks - Units for the complementary treatment and final disposal of liquid effluents - Design, construction and operation;
- NBR 9547:97 - Suspended particulate matter in ambient air - Determination of total concentration by the large volume sampler method;

- NBR 10004:2004 - Solid waste - Establishes the classification of solid waste in terms of its potential for the environment and public health, so that it can be properly managed;
- NBR 10007:2004 - Sampling of solid waste, which sets out the requirements for sampling solid waste;
- NBR 10151:2019 - Acoustics - Measurement and evaluation of sound pressure levels in inhabited areas - General purpose application;
- NBR 13221:2017 - Land transportation of waste;
- NBR 13896:1997 - Non-hazardous waste landfills - Criteria for design, implementation and operation;
- NBR ISO 14000:2015 - Environmental management systems - Requirements with guidance for Environmental Audits, Environmental Performance Assessment, Environmental Labeling and Product Life Cycle Analysis.

As stipulated by MMA Ordinance No. 280/20, waste generators are required to complete all necessary registration procedures to gather information and track waste. This includes issuing the Waste Transport Manifest (MTR), obtaining the Final Disposal Certificate (CDF) from waste disposal companies, submitting the Solid Waste Movement Declaration (DMR), and completing the Annual Solid Waste Inventory. These processes are conducted through systems provided by the federal and/or state governments.

At the state level, Law No. 2,080, of January 13th, 2000, establishes principles, procedures, standards, and criteria governing the generation, packaging, storage, collection, transport, treatment, and final disposal of solid waste in the state of Mato Grosso do Sul. Its primary objectives include controlling pollution, preventing contamination, and minimizing environmental impacts.

3.2.10. Effluents

CONAMA Resolution 430/11 establishes the conditions and standards for discharging effluents, which are liquid discharges from activities and processes. This complements and amends CONAMA Resolution 357/05.

3.2.11. Chemicals

The packaging and storage of hazardous chemicals, as well as the storage of fuel, must comply with legislation and legal requirements. In general, these regulations apply to chemical products:

- Federal Decree No. 10,088, of November 5th, 2019 consolidates normative acts issued by the Federal Executive Branch that pertain to the promulgation of conventions and recommendations of the International Labor Organization (ILO) ratified by the Federative Republic of Brazil;
- Regulatory Standard (NR) No. 26 - Safety Signs, last amended by Brazil's Ministry of Labor and Employment (MTE) Ordinance No. 704 of May 28th, 2015;
- ABNT's NBR 7500:2021 Identification for land transportation, handling, movement and storage of products;
- ABNT's NBR 14725: Chemicals - Safety, health and environmental information, Parts 1, 2, 3 and 4.

3.2.12. Cultural Heritage

Article 216 of the Federal Constitution of 1988 states that the Brazilian cultural heritage consists of the assets of a material and immaterial nature, taken individually or as a whole, which bear reference to the identity, action and memory of the various groups that form the Brazilian society:

- Forms of expression.
- Ways of creating, making and living.
- Scientific, artistic and technological creations.
- Works, objects, documents, buildings and other spaces intended for artistic and cultural expressions.
- Urban complexes and sites of historical, natural, artistic, archaeological, paleontological, ecological and scientific value.

Furthermore, Paragraph 1 of the same article establishes that the Government shall, with the cooperation of the community, promote and protect the Brazilian cultural heritage, by means of inventories, registers, vigilance, monument protection decrees, expropriation and other forms of precaution and preservation, with environmental licensing being classified in the latter.

In compliance with these constitutional commands, CONAMA Resolution No. 01/86, in its Article 6, Item I, Paragraph 'c,' determined that when conducting environmental impact studies, technical activities should encompass the examination of the community's archaeological, historical, and cultural sites and monuments. Additionally, these studies should investigate the dependency relationships between the local society, environmental resources, and the potential future use of these resources.

Regarding Intangible Cultural Heritage, its inclusion in environmental impact studies aligns with the objectives and guidelines of the National Intangible Heritage Program's (PNPI) promotion policy, established by Decree No. 3,551/00 and implemented within the federal government's scope by IPHAN.

Regarding archaeological and prehistoric assets, these are regulated by Law No. 3,924, of July 26th, 1961. The environmental licensing procedure must comply with IPHAN Normative Instruction No. 01, of March 25th, 2015, and Ordinance No. 375, of September 19th, 2018. The former establishes administrative procedures observed by the agency in environmental licensing processes it participates in, while the latter establishes IPHAN's Material Cultural Heritage Policy and includes other provisions.

3.2.13. Other Relevant Aspects

According to IBAMA Normative Instruction No. 06/13, which was amended by Normative Instruction No. 11, of April 13th, 2018, all individuals and legal entities conducting activities subject to environmental control must complete the Federal Technical Register of Activities Potentially Polluting and Using Environmental Resources (CTF-APP).

IBAMA Normative Instruction No. 13/21 regulates the obligation to register with the Federal Technical Register of Potentially Polluting Activities and Users of Environmental Resources while revoking the previously consolidated normative acts.

Law No. 10,165/00, while amending Law No. 6,938/81, which outlines the National Environmental Policy along with its purposes and mechanisms for formulation and application—previously mentioned in this report—established the Environmental Control and Inspection Fee (TCFA). This fee is triggered by the regular exercise of police power granted to the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA) for controlling and inspecting potentially polluting activities and users of natural resources.

3.3. LAND USE AND OCCUPANCY LEGAL CONSTRAINTS

It is the responsibility of the Municipal Government, in this case the municipality of Camapuã/MS, under general guidelines established by law, to establish urban development policies, including the organization of land use and occupation, within its territorial scope (CF, Article 30, item VIII). The general guidelines are set by the City Statute (Law No. 10.257/01).

The Municipal Government is also responsible for legislating on environmental matters and overseeing their management within the jurisdiction of the respective municipality. This includes adherence to federal and state provisions concerning the subject, acknowledging its alignment with local interests (CF, Article 30, Item I, and Law No. 6.938/1981, Article 6, Paragraph 2).

According to the Federal Constitution and the City Statute, Brazilian municipalities utilize the Municipal Master Plan (PDM) as the fundamental instrument for urban development and expansion policies. This requirement applies to municipalities with more than 20,000 inhabitants or an equivalent legal provision.

In Camapuã/MS, with a population of approximately 13,000 inhabitants, this instrument is defined by the Municipal Master Plan (Complementary Law No. 004, of November 21st, 2006). Similarly, the municipality of Figueirão maintains an active Master Plan established by Organic Law No. 5, of September 5th, 2006. In the same year, the municipality of Costa Rica also implemented its Municipal Master Plan through Complementary Law No. 18, of October 3rd, 2006.

4. PROJECT DESCRIPTION

The project is situated in the state of Mato Grosso do Sul, specifically within the region known as the Upper Taquari Zone (ZAT), located in the northern part of the state and encompassing 13 municipalities. The entire Upper Taquari Zone spans an area of approximately 25,948.17 km^2 (ZEE-MS, 2015).

The geological formation comprises the Botucatu and Serra Geral Formations, which form the predominant part of the Mesozoic sequence within the Paraná Basin. In Camapuã and Figueirão municipalities, the Botucatu Formation is characterized by well-selected, reddish-colored sandstones exhibiting well-rounded grains and high sphericity. These sandstones are arranged in extensive cross-stratified sets with minimal clay content. According to GEO-MS (2010), the Camapuã region predominantly showcases substantial aeolian deposition, reflected in thick sandstone layers, with numerous erosion focal points noticeable in deep ravines across dissected hills.

According to INMET data, the region experiences an average temperature of 25ºC and an annual rainfall ranging between 1,000 mm and 1,500 mm. The wettest months typically occur from December to March, while the driest months span from June to September.

Due to its location in high-altitude areas, the ZAT exhibits a high rainfall index, as indicated by the Climatological Norms spanning from 1977 to 2006. This reinforces the vulnerability of this zone in relation to its use and occupation, as highlighted in the ZEE-MS report from 2015.

According to Willink & Chernoff (2000), this region exhibited notably high levels of siltation in its watercourses, leading to severe degradation of gallery forests, springs, and overall water quality and quantity, particularly affecting smaller flows. The occupation of headwaters in the rivers draining this region has been identified as a significant contributor to the siltation issues observed in the Taquari's alluvial fan.

In terms of Land Use and Biodiversity, it's notable that this Zone encompasses a network of 18,980 km of watercourses and a basin exceeding 2.5 million hectares. The significance of this area in shaping the Paiaguás and Nhecolândia regions is attributed to the fluctuations in the deposition of the Taquari River's alluvial fan, as outlined in the ZEE-MS report from 2015.

The primary land use in the Taquari Zone consists of livestock occupying 1,505,331.54 ha, followed by agriculture covering 117,339.03 ha. Additionally, there is an area with urban influence spanning 1,743.12 ha, 10,324.26 ha designated for forestry, and 9,867.42 ha allocated to sugar cane cultivation. Regarding natural vegetation, the predominant areas include 764,414.01 ha of savannah, 98,470.08 ha of riparian vegetation, 11,787.12 ha of deciduous seasonal forest, 69,523.92 ha of naturally altered/managed areas, and 141.75 ha of secondary vegetation. Remarkably, the ZAT has already experienced the loss of more than 66% of its total area of 2,598,755.9 ha due to the conversion of original vegetation to agricultural and livestock purposes (ZEE-MS, 2015).

In this region, seven protected areas have been established, collectively covering 64,106.43 hectares, which accounts for less than 2.5% of the total area of this Zone in Mato Grosso do Sul. Notably, situated on the border between Goiás and Mato Grosso do Sul, the Emas National Park plays a distinctive role in safeguarding the Cerrado's biodiversity on the plateaus. Moreover, it serves as a linkage to the Taquari Springs State Park, facilitating a corridor between the Cerrado and the Pantanal ecosystems (ZEE-MS, 2015).

The linkage between the plateau and plain within the Taquari basin holds significant importance in preserving genetic diversity and plays a crucial role in colonization and re-colonization processes in the plain. This connectivity is especially critical for large predators and their prey, which traverse the riparian corridors or utilize resting and breeding areas in the plateaus while seeking feeding grounds in the plains. Among these species are the maned wolf (*Chrysocyon brachyurus*), the jaguar (*Panthera onca palustris*), as well as large birds of prey like the ornate hawk-eagle (*Spizaetus ornatus*), gray eagle (*Urubitinga coronata*), and the king vulture (*Sarcoramphus papa*) (ZEE-MS, 2015).

The Taquari area encompasses landscapes that hold significant environmental value due to their association with aquatic systems and vegetation, notably including the headwaters of the Jauru River, Coxim River, and Taquari River. This region boasts an extensive network of 18,979.59 km of rivers, along with landscapes hosting dense clusters of springs that maintain relatively connected plant remnants. These characteristics grant it priority status concerning environmental services. Essentially, areas providing such services within productive regions are deemed vital for local sustainable productivity. Notably, the Upper Taquari Zone holds considerable value in terms of services, given the pivotal role of the Taquari River in the dynamics of the Pantanal ecosystem (ZEE-MS, 2015).

Regarding cultural environmental services, the region boasts scenic attributes characterized by their beauty and cultural significance, including waterfalls, plateaus, and archaeological sites, some of which have already been utilized for tourism purposes. The 'Northern Tourist Route' holds considerable potential for nature tourism development, encompassing the municipalities of Camapuã, Rio Verde de Mato Grosso, São Gabriel do Oeste, Costa Rica, and Alcinópolis, all within areas situated in this Zone (ZEE-MS, 2015).

4.1. PROJECT ALPHA

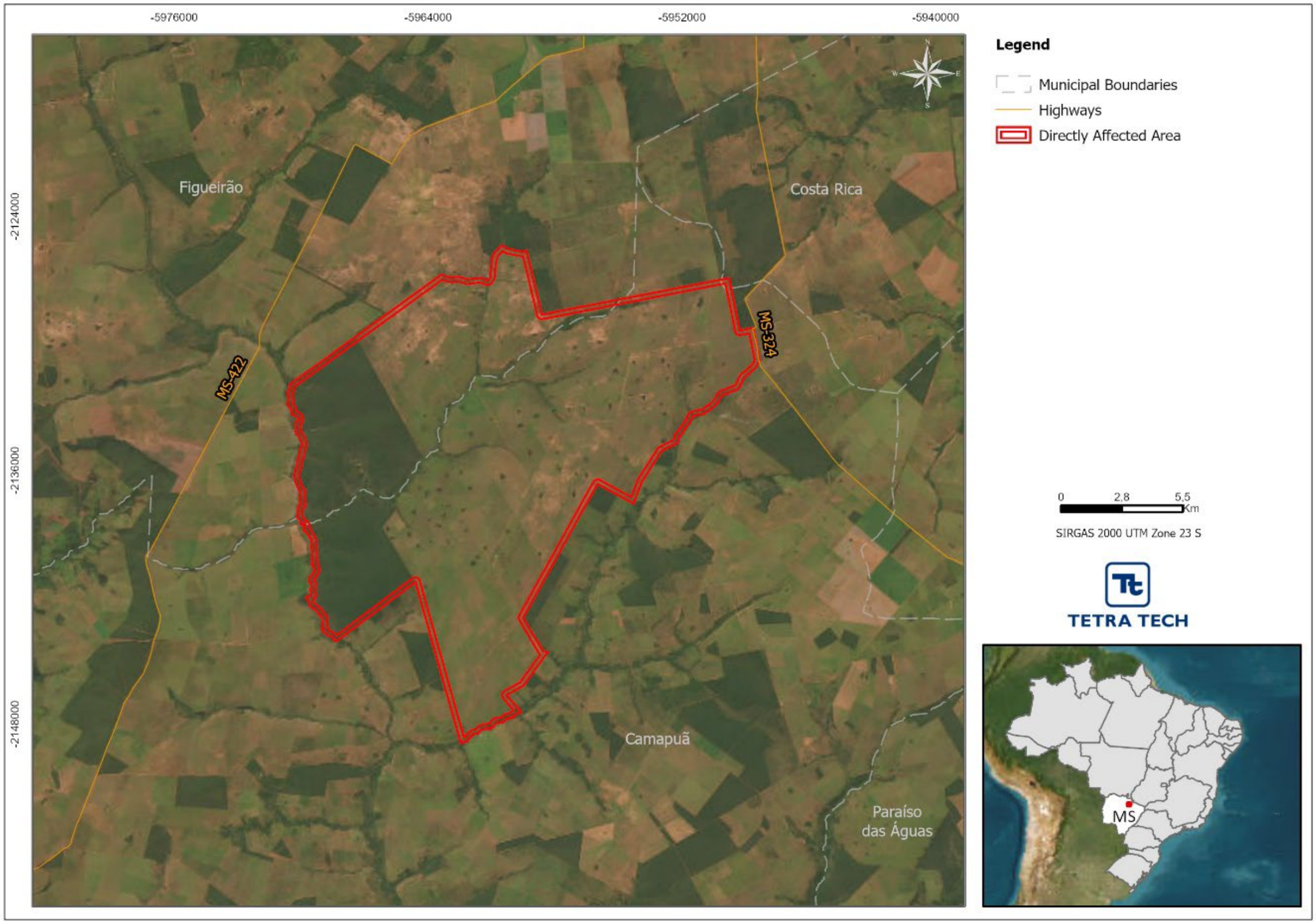
4.1.1. Activity

Project Alpha is owned by Camapuã Agropecuária LTDA, a company belonging to the reforestation strategy. Presently, the farm consists of areas dedicated to cattle grazing and an old, abandoned area with *Pinus* spp. trees. Plans entail converting the Project Alpha into a facility for cultivating eucalyptus wood using clones adapted to the region, primarily for sawn timber production. Additionally, a portion of the pasture area will be transformed into native forest vegetation.

4.1.2. Location

Project Alpha is located approximately 240 km from the capital of the state of Mato Grosso do Sul, the city of Campo Grande. Its territory includes the municipalities of Camapuã, Costa Rica and Figueirão, all municipalities in the state of Mato Grosso do Sul. Camapuã is the municipality that concentrates most of the area of the farm, around 69.57% of the total area, followed by Figueirão, with 30.40%, and Costa Rica, with 0.03% of the total 24,119 ha. The area in question represents 2.69% of the total area of the municipality of Camapuã, 1.50% of the area of the municipality of Figueirão and 0.002% of the area of the municipality of Costa Rica.

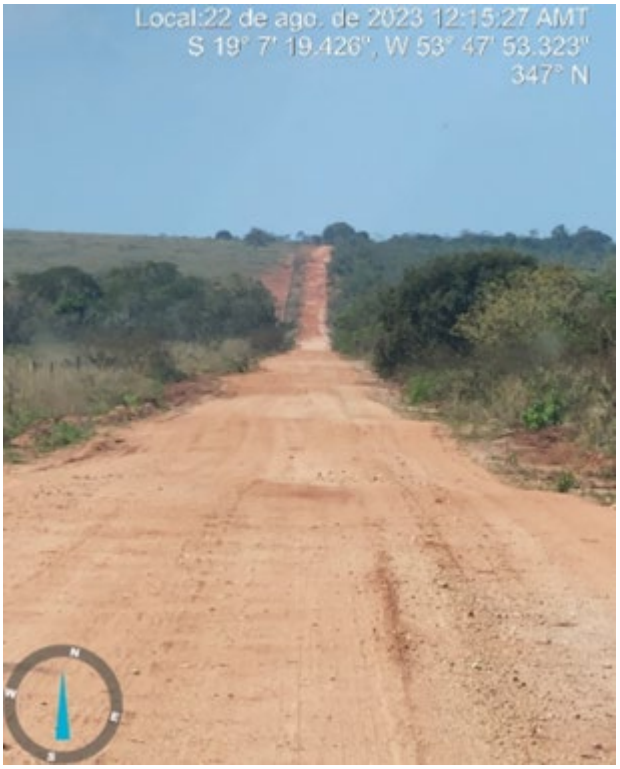
Figure 4-1- Location map of Project Alpha



4.1.3. Access roads

To reach Project Alpha from Campo Grande/MS, head north on the BR-060/BR-163 federal highway for approximately 96 kilometers. Continue on the BR-060 highway toward Camapuã/MS for about 50 kilometers. Then, take the MS-422 state highway and drive for 62 kilometers. Next, make a right turn onto the MS-436 (unpaved road) and proceed for 18 kilometers until you reach the farm gate. Finally, follow the main internal road for approximately 7.6 kilometers to reach the farm's headquarters. Signs indicating the way to Project Alpha are available along the route.

Photo 4-1- Internal road to Project Alpha's headquarters



Source: Tetra Tech (2023).

4.1.4. Current Activities (cattle and *Pinus* spp.)

At Project Alpha, cattle are presently raised in the pasture areas primarily for eventual sale as meat. The livestock farming operations are currently being phased out, with focus shifted solely to nutrition and healthcare for the cattle. The animals are sold as live cattle within the region. This cattle-raising activity at Project Alpha is anticipated to conclude by November 2023.

Another activity involves the cultivation of *Pinus* spp. trees through a leasing program established with the previous owner. Presently, the focus is solely on maintaining and preserving these trees for future timber trade. These plantations cover an approximate area of 300 hectares.

Photo 4-2– *Pinus* spp. plantation at Project Alpha.



Source: Tetra Tech (2023).

4.2. CHARACTERIZATION OF THE VENTURE

The farm's upcoming activity involves the cultivation and extraction of eucalyptus wood, a process that has already begun. Considering the terrain and its interaction with the eucalyptus plantation, the topography across the farm is gently undulating, devoid of gullies or noticeable irregularities. The soil, characterized by its sandy texture and reddish hue, consists of latosol and argisol of sandy texture, and neosol—deep soils that are vulnerable to erosion.

To facilitate the establishment of eucalyptus plantations, primary and secondary roads were constructed, incorporating ridges and containment basins—structures designed to manage rainfall effects and minimize and mitigate erosion. Additionally, efforts were made to prepare stands designated for the eucalyptus plantations. Furthermore, areas earmarked for nature conservation, such as Legal Reserves (RL), Permanent Preservation Areas (APP), and other Native Vegetation Restoration zones, were delineated.

4.2.1. Planting Areas

As per the company's Forest Management Plan, the eucalyptus plantations will cover 14,621 hectares, representing 62.62% of the total property area. The planting areas are divided into stands, with an average area of 50 hectares each (ISI 014 - 6.6), typically rectangular in shape. Roads have been established between these stands to provide access and facilitate silviculture-related activities, including tree planting. These roads serve as transportation routes for inputs such as seedlings and fertilizers, and are used for plant maintenance activities, like controlling non-eucalyptus plants and watering the seedlings. The planting of eucalyptus seedlings adheres to a specific criterion where their alignment follows the slope, from the highest to the lowest part

Photo 4-3 - Planting row with newly planted seedlings.



Source: Tetra Tech (2023).

Eucalyptus seedlings are sourced from partner nurseries, which deliver them to Project Alpha. The farm specifically selects hybrid (consisting of more than one species) and cloned Eucalyptus plants that exhibit the desired adaptation and growth characteristics.

Photo 4-4– Planting area six months old.



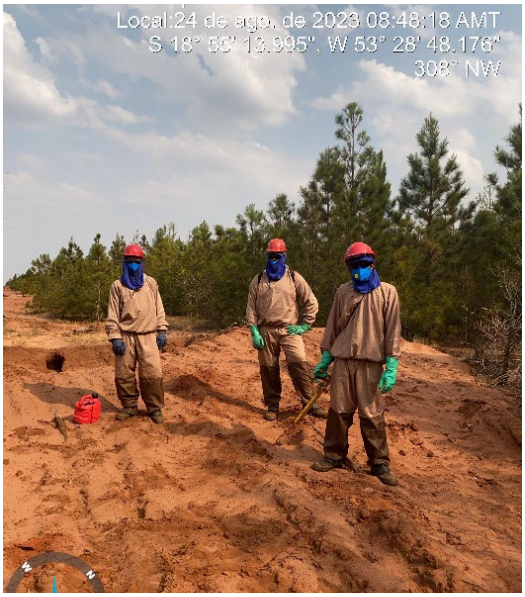
Source: Tetra Tech (2023).

The plantations maintain a spacing of approximately 4.5 meters between rows and two meters between individual plants (4.5 x 2m), with a 16-year rotation length between successive plantations.

4.2.2. Operation and Employees

The activities carried out by the company's staff mainly focus on planning, managing, and supervising the services provided by outsourced companies. Field operations at Project Alpha are conducted by outsourced employees hired through service companies acting on behalf of the company. It's important to note that all these outsourced companies are also obligated to follow and adhere to the Property Manager’s guidelines, procedures, and policies.

Photo 4-5– A team of contractors working on ant control in Pinus spp. plantations.



Source: Tetra Tech (2023).

The forest management carried out by the company primarily consists of a sequence of contracted activities characterized as follows.

4.2.2.1. Forestry and Management

The company maintains a specialized and experienced team in Forestry and Management, dedicated to meeting demands related to silviculture activities and supervising contracted activities, including soil preparation, application of agrochemicals and fertilizers, planting and silviculture practices. The planning of these silviculture activities is based on the availability of areas.

4.2.2.2. Coppicing and Area Cleaning Activities

These activities involve cleaning the areas where the seedlings will be planted, known as stands. The design of these stands is determined in advance by the the company's forestry planning and operations teams, while the implementation is carried out by service companies contracted by the company.

These activities involve opening up areas, referred to as stands, where seedlings will be planted. The configuration of these stands is predetermined by the company's forestry planning and operations teams, while the implementation is carried out by service companies contracted by the company.

There are several potential impacts associated with these activities, including:

- Soil disturbance due to the use of tractors and machinery;
- Emission of pollutants through tractor exhaust;
- Soil contamination;
- Generation of contaminated waste;
- Soil compaction due to heavy machinery traffic;
- Noise emissions from equipment operation.

Soil disturbance is an inherent aspect of these activities, yet it's crucial for operators to take measures to prevent conditions conducive to soil erosion. Mitigating the potential environmental impacts caused by machinery and equipment is of utmost importance. These impacts encompass emissions of pollutants from engine exhaust, fuel and hydraulic oil leaks, soil compaction, and noise pollution.

To minimize and mitigate these potential impacts, the company must adopt the following measures:

- Monitor the emission of pollutants from the engine exhaust using a specific program that regularly checks the levels of black smoke and other gases harmful to health and the environment. If the levels exceed the permitted limits, the machine should be adjusted or replaced.
- Prevent fuel, hydraulic oil and products leaks that could contaminate soil and water. This is achieved through regular preventive maintenance of the machines, inspecting hoses, connections, tanks, and filters. Additionally, in the event of a leak, the machine must be stopped immediately and a containment basin must be placed under the affected area until the machine is properly repaired. Contaminated soil must be removed and properly disposed.

- Minimize soil compaction, which can impact its structure, permeability, and fertility. To achieve this, the machines should operate solely on pre-designated roads and steer clear of sensitive areas like springs, water bodies, and native vegetation.
- Minimize the noise generated by the machine, which can cause hearing discomfort for operators and scare away local fauna. To achieve this, the machines must be equipped with an appropriate exhaust system designed to reduce noise levels. Operators should wear ear protection to minimize prolonged exposure to noise.

These measures are essential to ensure that the operation of machinery and equipment takes place in a responsible and sustainable manner, complying with environmental regulations and preserving natural resources.

4.2.2.3. Planting

This phase comprises a series of forestry activities aimed at fostering optimal conditions for the healthy growth of seedlings. The stages include Area Cleaning, Ant Control, Termite and Forest Protection, Weed Control, Soil Preparation, Fertilizer Application, Planting, Irrigation and, if necessary, Replanting. Further details about these activities are provided below.

➢ **Area Cleaning**

This initial stage involves land preparation before planting, encompassing the following environmental aspects and impacts:

- Removal of vegetation in the designated area;
- Accumulation of dead plant material on the ground after the area cleaning;
- Alterations to the landscape resulting from vegetation removal;
- Habitat loss for wildlife;
- Emission of pollutants from tractor exhausts;
- Soil contamination caused by leaks;
- Generation of contaminated waste;
- Soil compaction due to heavy machinery traffic;
- Noise emissions from equipment operation.

Removing vegetation is an essential part of the activity, but it's crucial for operators to handle the equipment with care and adhere to the appropriate guidelines for the work area. Assessing plant litter accumulation is necessary, and if needed, it should be collected to prevent it from becoming a source of contamination, seed dispersal, or fire hazards. It's imperative to control the potential environmental ascpects and impacts caused by machinery and equipment, including emissions from engine exhausts, fuel and hydraulic oil leaks, soil compaction, and noise emissions. To minimize and mitigate these potential impacts, the company must adopt the following measures:

- Monitor the emission of pollutants from the engine exhaust using a specific program that regularly checks the levels of black smoke and other gases harmful to health and the environment. If the levels exceed the permitted limits, the machine should be adjusted or replaced.
- Prevent fuel, hydraulic oil and products leaks that could contaminate soil and water. This is achieved through regular preventive maintenance of the machines, inspecting hoses, connections, tanks, and filters. Additionally, in the event of a leak, the machine must be stopped immediately and a containment basin must be placed under the affected area until the machine is properly repaired. Contaminated soil must be removed and properly disposed.
- Minimize soil compaction, which can impact its structure, permeability, and fertility. To achieve this, the machines should operate solely on pre-designated roads and steer clear of sensitive areas like springs, water bodies, and native vegetation.
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These measures are intended to ensure that the operation of machinery and equipment takes place in a responsible and sustainable manner, complying with environmental regulations and preserving natural resources.

➢ **Ant Control**

Ant control does not intend to eliminate but to manage the ant population to a level that avoids economic damage to the plantation. This activity occurs at various stages: before planting, during forest monitoring and after timber harvest. Additionally, inspections are conducted to identify anthills. Recommended dosages adhere to both the companys's guidelines and those provided by the manufacturer. Granulated baits, IPMs, powdered insecticides, or thermal sprays are utilized based on weather conditions and the extent of infestation. Potential environmental aspects and impacts associated with this activity include:

- Soil and water contamination;
- Operator intoxication when handling ant control product;
- Generation of contaminated packaging;
- Emission of pollutants by vehicles transporting ant control product;
- Soil contamination due to leaks;
- Generation of contaminated waste.

When conducting this activity, it's crucial to adhere to the recommendations outlined in the technical specifications to prevent ant control product spills. In case of spillage, it must be promptly collected and disposed of as hazardous waste. Operators must utilize the appropriate Personal Protective Equipment (PPE). The quantity to be applied should correspond to the infestation level, and the application instructions must be established by a technical manager. Disposal of ant control product packaging should be handled as hazardous material.

It's imperative to control the potential environmental aspects and impacts caused by machinery and equipment, including emissions from engine exhausts, fuel and hydraulic oil leaks, soil compaction, and noise emissions. To minimize and mitigate these potential impacts, the company must adopt the following measures:

- Monitor the emission of pollutants from the engine exhaust using a specific program that regularly checks the levels of black smoke and other gases harmful to health and the environment. If the levels exceed the permitted limits, the machine should be adjusted or replaced.
- Prevent fuel, hydraulic oil and products leaks that could contaminate soil and water. This is achieved through regular preventive maintenance of the machines, inspecting hoses, connections, tanks, and filters. Additionally, in the event of a leak, the machine must be stopped immediately and a containment basin must be placed under the affected area until de machine is properly repaired. Contaminated soil must be removed and properly disposed.

- Minimize soil compaction, which can impact its structure, permeability, and fertility. To achieve this, the machines should operate solely on pre-designated roads and steer clear of sensitive areas like springs, water bodies, and native vegetation.
- Minimize the noise generated by the machine, which can cause hearing discomfort for operators and scare away local fauna. To achieve this, the machines must be equipped with an appropriate exhaust system designed to reduce noise levels. Operators should wear ear protection to minimize prolonged exposure to noise.

These measures are intended to ensure that the operation of machinery and equipment takes place in a responsible and sustainable manner, complying with environmental regulations and preserving natural resources.

➢ **Forest Protection**

Forest protection plays a vital role, aiming to prevent and manage pests and diseases in plantation areas. This activity can be conducted at any stage of plant growth, depending on the detection of infestations. Potential environmental aspects and impacts associated with this activity include:

- Soil and water contamination;
- Risk of intoxication of the applicator and/or operator due to the use of insecticide during application;
- Emission of pollutants from tractor exhaust;
- Soil contamination resulting from leaks;
- Generation of contaminated waste;
- Soil compaction due to heavy machinery traffic;
- Noise emissions from equipment operation;
- Generation of contaminated packaging.

During the preparation of the product mixture, wearing the recommended Personal Protective Equipment (PPE) and strict compliance with technical guidelines are essential. Monitoring wind is imperative to prevent product drift into unintended areas, such as natural reserves and Permanent Preservation Areas (APPs). Moreover, it's advisable to avoid preparing the mixture in proximity to natural reserves and APPs.

It's imperative to control the potential environmental aspects and impacts caused by machinery and equipment, including emissions from engine exhausts, fuel and hydraulic oil leaks, soil compaction, and noise emissions. To minimize and mitigate these potential impacts, the company must adopt the following measures:

- Monitor the emission of pollutants from the engine exhaust using a specific program that regularly checks the levels of black smoke and other gases harmful to health and the environment. If the levels exceed the permitted limits, the machine should be adjusted or replaced.
- Prevent fuel, hydraulic oil and product leaks that could contaminate soil and water. This is achieved through regular preventive maintenance of the machines, inspecting hoses, connections, tanks, and filters. Additionally, in the event of a leak, the machine must be stopped immediately and a containment basin must be placed under the affected area until the machine is repaired. Contaminated soil must be removed and properly disposed.
- Minimize soil compaction, which can impact its structure, permeability, and fertility. To achieve this, the machines should operate solely on pre-designated roads and steer clear of sensitive areas like springs, water bodies, and native vegetation.
- Minimize the noise generated by the machine, which can cause hearing discomfort for operators and scare away local fauna. To achieve this, the machines must be equipped with an appropriate exhaust system designed to reduce noise levels. Operators should wear ear protection to minimize prolonged exposure to noise.

These measures are intended to ensure that the operation of machinery and equipment takes place in a responsible and sustainable manner, complying with environmental regulations and preserving natural resources.

➢ **Weed Control**

Vegetation control prepares the area for planting by suppressing competition from weeds. This is achieved using knapsack sprayers or tractors with sprayers. The company advises on the selection of herbicides and their recommended dosages, taking into account the type of vegetation and the level of infestation in the area. Proper disposal of agrochemical packaging is dictated by the company's procedural instructions, encompassing the processes of washing, disposing of, and returning agrochemical packaging (ISI 015).

The potential environmental aspects and impacts associated with this activity include:

- Soil and water contamination;

- Risk of intoxication of the applicator due to the use of herbicide during application;
- Emission of pollutants from tractor exhaust;
- Soil contamination resulting from leaks;
- Generation of contaminated waste;
- Soil compaction due to heavy machinery traffic;
- Noise emissions from equipment operation;
- Generation of contaminated packaging;
- Contamination of natural vegetation due to herbicide drift.

To conduct this activity responsibly, strict adherence to the recommendations in the technical specifications is essential. Prevention of herbicide spillage is crucial, and in case of any spills, the material must be promptly collected and disposed of as hazardous waste. Operators are required to wear the specified Personal Protective Equipment (PPE) and wash it separately after each use. The application quantity should align with the infestation level, and guidance on appropriate amounts should be provided by the technical manager. Proper disposal of agrochemical packaging as hazardous material is mandatory.

During herbicide application, it is vital to monitor weather conditions, avoiding application during windy or rainy periods to prevent herbicide drift into unintended areas like natural reserves and Permanent Preservation Areas (APPs). Additionally, it's recommended not to prepare the mixture in close proximity to natural reserves and APPs.

Once again, it is important to emphasize that controlling the potential environmental impacts caused by the operation of machinery and equipment is a fundamental concern. Therefore, the following measures should be adopted:

- Monitor the emission of pollutants from the engine exhaust using a specific program that regularly checks the levels of black smoke and other gases harmful to health and the environment. If the levels exceed the permitted limits, the machine should be adjusted or replaced.
- Prevent fuel, hydraulic oil and products leaks that could contaminate soil and water. This is achieved through regular preventive maintenance of the machines, inspecting hoses, connections, tanks, and filters. Additionally, in the event of a leak, the machine must be stopped immediately and a containment basin must be placed under the affected area until the machine is properly repaired. Contaminated soil must be removed and properly disposed.
- Minimize soil compaction, which can impact its structure, permeability, and fertility. To achieve this, the machines should operate solely on pre-designated roads and steer clear of sensitive areas like springs, water bodies, and native vegetation.

- Minimize the noise generated by the machine, which can cause hearing discomfort for operators and scare away local fauna. To achieve this, the machines must be equipped with an appropriate exhaust system designed to reduce noise levels. Operators should wear ear protection to minimize prolonged exposure to noise.

These measures are intended to ensure that the operation of machinery and equipment takes place in a responsible and sustainable manner, complying with environmental regulations and preserving natural resources.

➢ **Soil Preparation**

The goal of soil preparation is to optimize conditions for successful tree establishment and growth. Potential environmental aspects and impacts associated with this activity include:

- Soil disturbance;
- Soil contamination;
- Emission of pollutants from tractor exhaust;
- Soil contamination resulting from leaks;
- Generation of contaminated waste;
- Soil compaction due to heavy machinery traffic;
- Noise emissions from equipment operation.

Soil disturbance is an inherent aspect of this activity; however, the operator must adhere to the instructions outlined in the management plan to prevent soil erosion within the work area.

With regard to controlling the potential environmental aspects and impacts caused by the operation of machinery and equipment, various measures can be adopted:

- Monitor the emission of pollutants from the engine exhaust using a specific program that regularly checks the levels of black smoke and other gases harmful to health and the environment. If the levels exceed the permitted limits, the machine should be adjusted or replaced.
- Prevent fuel, hydraulic oil and products leaks that could contaminate soil and water. This is achieved through regular preventive maintenance of the machines, inspecting hoses, connections, tanks, and filters. Additionally, in the event of a leak, the machine must be stopped immediately and a containment basin must be placed under the affected area until the machine is properly repaired. Contaminated soil must be removed and properly disposed.

- Minimize soil compaction, which can impact its structure, permeability, and fertility. To achieve this, the machines should operate solely on pre-designated roads and steer clear of sensitive areas like springs, water bodies, and native vegetation.
- Minimize the noise generated by the machine, which can cause hearing discomfort for operators and scare away local fauna. To achieve this, the machines must be equipped with an appropriate exhaust system designed to reduce noise levels. Operators should wear ear protection to minimize prolonged exposure to noise.

These measures are intended to ensure that the operation of machinery and equipment takes place in a responsible and sustainable manner, complying with environmental regulations and preserving natural resources.

➢ **Fertilizer Application**

Fertilizer application is conducted to supply seedlings with the necessary macro- and micronutrients to develop properly in the field. Potential environmental aspects and impacts associated with this activity include:

- Soil contamination;
- Emission of pollutants from tractor exhaust;
- Soil contamination resulting from leaks;
- Generation of contaminated waste;
- Soil compaction due to heavy machinery traffic;
- Noise emissions from equipment operation;
- Generation of contaminated packaging.

The quantity of fertilizer used in this activity should be determined by the technical manager. The operator must calibrate the machine to apply the most precise amount possible. Throughout the operation, regular checks should be conducted to ensure the applied quantities align with the recommendations.

Controlling the potential environmental aspects and impacts caused by the operation of machinery and equipment is extremely important. Therefore, the following measures should be implemented:

- Monitor the emission of pollutants from the engine exhaust using a specific program that regularly checks the levels of black smoke and other gases harmful to health and the environment. If the levels exceed the permitted limits, the machine should be adjusted or replaced.

- Prevent fuel, hydraulic oil and products leaks that could contaminate soil and water. This is achieved through regular preventive maintenance of the machines, inspecting hoses, connections, tanks, and filters. Additionally, in the event of a leak, the machine must be stopped immediately and a containment basin must be placed under the affected area until the machine is properly repaired. Contaminated soil must be removed and properly disposed.
- Minimize soil compaction, which can impact its structure, permeability, and fertility. To achieve this, the machines should operate solely on pre-designated roads and steer clear of sensitive areas like springs, water bodies, and native vegetation.
- Minimize the noise generated by the machine, which can cause hearing discomfort for operators and scare away local fauna. To achieve this, the machines must be equipped with an appropriate exhaust system designed to reduce noise levels. Operators should wear ear protection to minimize prolonged exposure to noise.

These measures are intended to ensure that the operation of machinery and equipment takes place in a responsible and sustainable manner, complying with environmental regulations and preserving natural resources.

➢ **Planting and Replanting**

The planting and replanting stages are pivotal in the cultivation process, involving the careful placement of seedlings into the soil. Ensuring maximum contact between the seedling roots and the soil is essential, achieved by gently pressing soil down around the seedling. Replanting, conversely, involves replacing seedlings due to the mortality of initially planted seedling. The procedures and tools utilized in replanting are the same employed in the initial planting process.

The potential environmental aspects and impacts related to this activity can be identified as follows:

- Soil and water contamination;
- Emission of pollutants from tractor exhaust;
- Soil contamination due to leaks;
- Generation of contaminated waste;
- Soil compaction due to heavy machinery traffic;
- Noise emissions from equipment operation.

When conducting this operation, it's crucial to prevent water bodies and soil contamination. In case of leaks, any spilled material should be collected and stored for subsequent disposal as hazardous waste. Operators engaged in this operation must wear the recommended Personal Protective Equipment (PPE).

It's imperative to control the potential environmental aspects and impacts caused by machinery and equipment, including emissions from engine exhausts, fuel, hydraulic oil and products leaks, soil compaction, and noise emissions. To minimize and mitigate these potential impacts, the company must adopt the following measures:

- Monitor the emission of pollutants from the engine exhaust using a specific program that regularly checks the levels of black smoke and other gases harmful to health and the environment. If the levels exceed the permitted limits, the machine should be adjusted or replaced.
- Prevent fuel, hydraulic oil and products leaks that could contaminate soil and water. This is achieved through regular preventive maintenance of the machines, inspecting hoses, connections, tanks, and filters. Additionally, in the event of a leak, the machine must be stopped immediately and a containment basin must be placed under the affected area until the machine is properly repaired. Contaminated soil must be removed and properly disposed.
- Minimize soil compaction, which can impact its structure, permeability, and fertility. To achieve this, the machines should operate solely on pre-designated roads and steer clear of sensitive areas like springs, water bodies, and native vegetation.
- Minimize the noise generated by the machine, which can cause hearing discomfort for operators and scare away local fauna. To achieve this, the machines must be equipped with an appropriate exhaust system designed to reduce noise levels. Operators should wear ear protection to minimize prolonged exposure to noise.

These measures are intended to ensure that the operation of machinery and equipment takes place in a responsible and sustainable manner, complying with environmental regulations and preserving natural resources.

➢ **Irrigation**

This activity involves supplying water to the seedlings as needed, considering both weather conditions and plant requirements.

The potential environmental aspects and impacts related to this activity can be listed as follows:

- Water abstraction;
- Emission of pollutants from tractor exhaust;
- Exposure to weather conditions;
- Soil contamination due to leaks;
- Generation of contaminated waste;
- Soil compaction due to heavy machinery traffic;
- Noise emissions from equipment operation.

When abstracting water, it is essential to do so only at designated and properly identified points, preventing any leakage during the process.

As with other operations involving the use of machinery and equipment, it is extremely important to control the associated potential environmental aspects and impacts. To minimize or mitigate them, the company should adopt the following measures:

- Monitor the emission of pollutants from the engine exhaust using a specific program that regularly checks the levels of black smoke and other gases harmful to health and the environment. If the levels exceed the permitted limits, the machine should be adjusted or replaced.
- Prevent fuel, hydraulic oil and products leaks that could contaminate soil and water. This is achieved through regular preventive maintenance of the machines, inspecting hoses, connections, tanks, and filters. Additionally, in the event of a leak, the machine must be stopped immediately and a containment basin must be placed under the affected area until the machine is properly repaired. Contaminated soil must be removed and properly disposed.
- Minimize soil compaction, which can impact its structure, permeability, and fertility. To achieve this, the machines should operate solely on pre-designated roads and steer clear of sensitive areas like springs, water bodies, and native vegetation.
- Minimize the noise generated by the machine, which can cause hearing discomfort for operators and scare away local fauna. To achieve this, the machines must be equipped with an appropriate exhaust system designed to reduce noise levels. Operators should wear ear protection to minimize prolonged exposure to noise.

These measures are intended to ensure that the operation of machinery and equipment takes place in a responsible and sustainable manner, complying with environmental regulations and preserving natural resources.

4.2.2.4. Forest Maintenance

Once forest planting is complete, the plant development phase begins, in which various contracted activities are necessary to allow the trees to grow fully.

1) Area cleaning: This stage involves weeding and/or mowing. Cleaning covers the row, inter-row and 100% of the planting area.
2) Weed and vegetation control: occurs through manual, mechanized or chemical mowing.
3) Top dressing: Top dressing involves applying fertilizers after planting and can be done manually or mechanically.

A fundamental aspect of forest maintenance activities is the control of potential environmental aspects and impacts that may arise. To minimize and/or mitigate these potential impacts, the company must adopt the recommended measures.

These measures are essential to ensure that the operation of machinery and equipment takes place in a responsible and sustainable manner, complying with environmental regulations and preserving natural resources.

4.2.2.5. Roads and Firebreaks Implantation and Maintenance

Third-party companies contracted by the company execute road construction and maintenance systematically to fulfill mobility, accessibility, and transportation requirements. This process aims to avoid potential adverse environmental impacts, especially related to erosion, water quality and biodiversity.

Civil constructions are undertaken by service providers, consistently adhering to legal regulations and technical as well as environmental standards. Detailed procedures for the construction and maintenance of roads are outlined in the Work Instructions prepared by the company for the Implementation and Maintenance of Forest Roads and Firebreaks (ISI 014). Similarly, guidelines for soil and water conservation practices are detailed in the Water and Soil Conservation instructions (IMA 003).

Potential environmental aspects and impacts related to these activities can be listed as follows:

- Soil disturbance due to the use of tractors;
- Emission of pollutants from tractor exhaust;

- Soil contamination due to leaks;
- Generation of contaminated waste;
- Soil compaction caused by heavy machinery traffic;
- Noise emissions from equipment operation.

Soil disturbance is an inherent aspect of these activities, yet it's crucial for operators to take measures to prevent conditions conducive to soil erosion. Mitigating the potential environmental impacts caused by machinery and equipment is of utmost importance. These impacts encompass emissions of pollutants from engine exhaust, fuel and hydraulic oil leaks, soil compaction, and noise pollution.

To minimize and mitigate these potential impacts, the company must adopt the following measures:

- Monitor the emission of pollutants from the engine exhaust using a specific program that regularly checks the levels of black smoke and other gases harmful to health and the environment. If the levels exceed the permitted limits, the machine should be adjusted or replaced.

- Prevent fuel, hydraulic oil and products leaks that could contaminate soil and water. This is achieved through regular preventive maintenance of the machines, inspecting hoses, connections, tanks, and filters. Additionally, in the event of a leak, the machine must be stopped immediately and a containment basin must be placed under the affected area until the machine is properly repaired. Contaminated soil must be removed and properly disposed.
- Minimize soil compaction, which can impact its structure, permeability, and fertility. To achieve this, the machines should operate solely on pre-designated roads and steer clear of sensitive areas like springs, water bodies, and native vegetation.
- Minimize the noise generated by the machine, which can cause hearing discomfort for operators and scare away local fauna. To achieve this, the machines must be equipped with an appropriate exhaust system designed to reduce noise levels. Operators should wear ear protection to minimize prolonged exposure to noise.

These measures are essential to ensure that the operation of machinery and equipment takes place in a responsible and sustainable manner, complying with environmental regulations and preserving natural resources.

4.2.3. Property Security

Security activities at Project Alpha are executed by a third-party service company contracted by the company. These activities encompass various facility functions, such as forest monitoring concerning environmental issues and forest health, as well as overseeing stock control and regulating authorized access to agrochemicals and waste warehouses on the premises.

The primary objective of property security activities is to prevent malicious actions that could result in theft, intrusions, fires, unauthorized hunting, or fishing on the property. This is accomplished through patrols and monitoring methods, incorporating the utilization of drones and video camera systems.

In addition, the company's team is trained to monitor pests and able to identify areas with uncontrolled infestations. It is important to note that there is a detailed operating procedure describing property surveillance operations, which is part of the Management System (ISG 004). Waste and agrochemicals storage control are covered in item 6.4, activity 4, while pest and disease monitoring are established in item 6.8, sub-item 2, i2 and ii9.

The use of vehicles during security activities can potentially impact the environment. Some potential environmental aspects and impacts include:

a) The generation of hazardous waste from the maintenance of vehicles used in patrols;
b) Noise generation;
c) Soil compaction caused by the traffic of vehicles;
d) Emission of black smoke from improperly maintained vehicles;
e) Running over animals.

Regarding item a) mentioned above, it is important to note that vehicle maintenance occurs outside the Project Alpha property. Nevertheless, the supplier is obligated to adhere to procedures and guidelines concerning the potential generation, transportation, and disposal of solid waste contaminated by oil and grease during the maintenance of the vehicles used at Project Alpha.

While conducting patrols, it is crucial for security guards to observe speed limits to prevent running over animals. Controlling potential environmental impacts is of utmost importance. These impacts encompass pollutant emissions from engine exhaust, fuel and hydraulic oil leaks, soil compaction, and noise. To minimize and mitigate these effects, the company must implement the following measures:

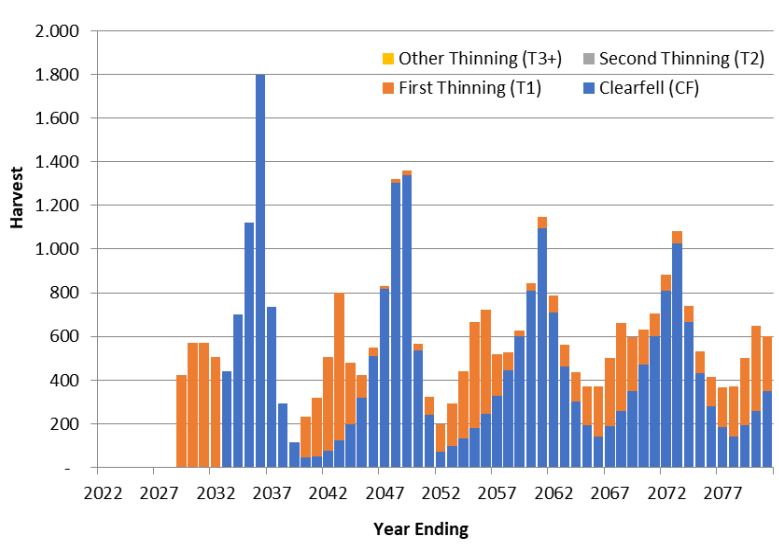
- Monitor the emission of pollutants from the vehicle's engine exhaust using a specific program that regularly checks the levels of black smoke and other gases harmful to health and the environment. If the levels exceed the permitted limits, the machine should be adjusted or replaced.
- Prevent fuel, hydraulic oil and products leaks that could contaminate soil and water. This is achieved through regular preventive maintenance of the vehicles, inspecting hoses, connections, tanks, and filters. Additionally, in the event of a leak, the vehicle must be stopped immediately and a containment basin must be placed under the affected area until the machine is properly reapired. Contaminated soil must be removed and properly disposed.
- Minimize the noise generated by the vehicles, which can cause hearing discomfort for operators and scare away local fauna. To achieve this, the vehicles must be equipped with an appropriate exhaust system designed to reduce noise levels.
- Prevent soil compaction caused by vehicle traffic by maintaining roads and tractor tracks, as well as implementing environmental management techniques to protect soil integrity.
- Prevent animals from being run over by implementing protective measures, such as adequate signage in animal crossing areas, and providing instructions and guidance for employees to focus on wildlife preservation.

These measures are intended to ensure that the operation of machinery and equipment takes place in a responsible and sustainable manner, complying with environmental regulations and preserving natural resources.

4.2.4. Production Capacity

The production capacity has not yet been determined because the first rotation harvest has not taken place and the increment has not been measured. However, the chart below shows the estimated harvest per year.

Figure 4-2 – Project Alpha's estimated harvest per year



4.2.5. Description of raw materials, inputs and chemicals

To safeguard the areas planted with eucalyptus, several programs have been established to prevent and combat potential pests that may impede plant development or even cause them to die, thereby jeopardizing the enterprise's economic viability.

According to the company's Forest Management Plan, the main pests affecting plants are defoliating and sap-sucking insects. These programs, which utilize insecticides, are designed for implementation only when pest populations compromise plant health. The company uses various active ingredients at Project Alpha, including Sulfuramide and Deltamethrin (for ant control), Imidacloprid (for termite control), Isoxaflutole, Triclopyr-butyl, and Glyphosate (as herbicides), alongside an adjuvant product named *Fultech Max*. Application of these products is conducted under the supervision and guidance of a responsible technician.

Chemicals are stored in a dedicated warehouse designated for hazardous materials, accessible only to authorized personnel. This warehouse is situated at the Project Alpha headquarters. Ant control substances are kept in a distinct room from herbicides and other insecticides. Product withdrawals are documented through a form managed by an outsourced employee, a procedure outlined in ISG 004, item 6.4, activity 4.

Handling hazardous products such as herbicides, insecticides, and ant control substances can potentially impact the environmentt:

a) Soil contamination;
b) Water contamination;
c) Intoxication of the involved employees;
d) Generation of contaminated waste.

To prevent water and soil contamination, hazardous products are stored in a dedicated warehouse with a roof, impermeable flooring, and walls that restrict access to animals or unauthorized individuals. Utilizing personal protective equipment (PPE) during handling is imperative to minimize the risk of intoxication. Used PPE is disposed of as hazardous waste, and empty packaging is also treated as hazardous waste.

The company operates a program for disposing of hazardous chemical packaging and contamined waste, aligned with the following Work Instructions: IMA 001 - Waste Disposal, IMA 002 - Leak Control, ISI 009 - Ant Control, ISI 013 - PPE Washing for Pesticide Application, ISI 015 - Washing, Disposal, and Return of Pesticide Packaging, and ISI 018 - Storage of Inputs and Pesticides.

Photo 4-6– Warehouse for chemicals and dangerous goods



Source: Tetra Tech (2023).

4.2.6. Description of the production process

Project Alpha focuses on eucalyptus for timber. The production process begins with land preparation and the management of pests and diseases, such as ants, termites and pathogens. Following soil preparation, fertilizers are applied, and weed control measures are implemented. Seedlings are then planted along designated rows, accompanied by one or two irrigation sessions to prevent dehydration. Planting gel is added to the planting rows, gradually supplying moisture to the roots. ISI 010 advises that polymers must also be used to support irrigation. Throughout the plants' growth, monitoring will be carried out with a focus on pest and disease management, nutritional supplementation, and assessing wood volume increment in the trees. Proactive measures are consistently taken to prevent and combat forest fires throughout the entire process

4.2.7. Environmental Control

The environmental controls regarding the treatment of waste generated in Project Alpha's various activities are structured as follows:

- Selective waste collection: The farm employs a selective waste collection system aimed at preventing unwanted mixing of waste, promoting reuse, recycling, and appropriate final disposal.
- Waste storage management: The management and control of waste warehouses, along with the monitoring of incoming and outgoing waste, are handled by an outsourced service company. This outsourced service company, contracted by the company, is also responsible for property security and surveillance. Additionally, the final disposal of hazardous waste is conducted by a specialized treatment plant, evaluated and approved annually, and also contracted by the company.
- Training and guidance: the company offers training to its staff and sets guidelines for waste segregation and disposal, as outlined in the work instructions for waste disposal (IMA 001) and the Solid Waste Management Plan (FMA 001.01).
- Agrochemical packaging: Empty agrochemical packaging is stored in warehouses with designated areas for each class of product or material. Disposal aligns with the guidelines outlined in the work instructions for washing, disposing of, and returning agrochemical packaging (ISI 015).
- Classification and differentiated management: There are specific procedures for handling recyclable, non-recyclable, organic, and toxic materials. Class I waste, containing chemical substances deemed hazardous for both humans and the environment, is directed to specific temporary warehouses built in accordance with the specifications outlined in NBR 12235.
- The hazardous solid waste is stored and subsequently disposed of in compliance with current legislation.

Photo 4-7 – Hazardous waste storage



Source: Tetra Tech (2023).

The outsourced companies contracted to work at Project Alpha use their own machinery and equipment. They conduct regular maintenance on or off the farm, ensuring proper disposal of contaminated waste and parts. These companies are directed to adhere to all of the company's procedures and instructions and may utilize Project Alpha's structures, when authorized to do so, as needed.

During the on-site inspection, it was noted that some cars and equipment at the farm's headquarters were parked directly on the grass without any containment measures to prevent potential environmental impacts from leaks. Additionally, an area adjacent to the headquarters, previously utilized for livestock activities and featuring an impermeable floor, was identified. It is recommended that this area be repurposed as a parking lot to prevent potential soil contamination from oil and other waste leaks

It is crucial that the supplier possesses supporting documentation for the entire waste cycle, from its generation to its final disposal. This documentation should include evidence of the waste quantity generated, its storage method, and the engagement of a certified transportation company, along with the Waste Transportation Manifest (MTR) specifying its disposal.

Photo 4-8– Tractors without drip trays. Risk of soil contamination.



Source: Tetra Tech (2023).

Photo 4-9– Pickup truck without drip tray parked on the grass. Risk of soil contamination.



Source: Tetra Tech (2023).

During the inspection, it was also noted that contaminated implements were exposed, and products resulting from the phaseout of livestock activity were stored without proper identification.

In this context, we recommend reorganizing the spaces and appropriately disposing of the waste following the phaseout of the livestock activity. Additionally, we suggest reviewing the company's procedures and increasing audits and inspections in the area until the closing down process is complete.

These measures will significantly enhance the efficient and environmentally responsible management of waste and resources associated with the phaseout of cattle ranching activities.

Photo 4-10– Grease gun exposed.



Source: Tetra Tech, 2023.

Photo 4-11– Products stored without identification.



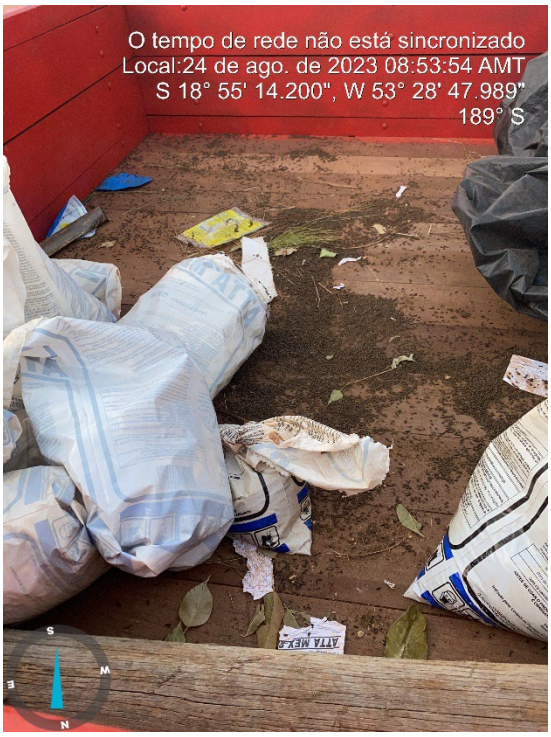
Source: Tetra Tech, 2023.

An opportunity for improving the handling of hazardous products arose during the observation of the ant control product application. It was noted that the truck transporting the ant control substance had products outside their packaging, indicating an irregular arrangement that could result in losses.

This situation was promptly reported to the foreman of the service company responsible for the ant control product application. A recommendation was made to place a tarpaulin under the boxes and packaging to both mitigate the risk of product loss and prevent soil contamination.

This measure aims to enhance safety and compliance in handling hazardous products, ensuring the integrity of the products and safeguarding the environment.

Photo 4-12– Ant control product out of the package.



Source: Tetra Tech (2023).

Another observed control involves managing black smoke emissions and leaks from vehicles, machinery, and equipment, as outlined in the company's Work Instruction for Vehicle, Machinery, and Equipment Inspection - IMM001.

This control and monitoring procedure is conducted periodically by employees of a third-party company contracted by the company. They perform field inspections and/or evaluate vehicle and equipment reports using checklists. Upon identifying black smoke emissions or leaks, the respective vehicle or equipment is immediately deactivated until the issue is rectified. Their return to the farm is authorized only after confirming that all identified non-conformities have been corrected.

It is important to note that black smoke emissions not only pose health risk, but also contribute to air pollution. This concern has been regulated by CONTRAN (National Traffic Council) since 1977. Currently, CONTRAN Resolution 452, of September 26th, 2013 provides specific guidelines to regulate this issue.

4.2.8. Environmental Control System

Environmental controls are integrated into the implemented Environmental Management System (EMS), aligning with the internationally recognized guidelines and standards of the Forest Stewardship Council (FSC). This approach ensures that the company's activities and operations strictly adhere to sustainable forest management standards, ensuring responsible practices and environmental preservation.

The Forest Stewardship Council (FSC) is a global organization that establishes standards for responsible forest management. The primary objective of the FSC Standard is to advocate for forest conservation and ensure the sustainable management of forested areas.

The adoption of an environmental management system, like ISO 14001, was recommended by the IFC in its Guidance Notes 01, 05, and 06. ISO 14001 is an international standard that outlines the requirements for establishing an efficient environmental management system within organizations. Its emphasis lies in minimizing environmental impact and ensuring compliance with environmental laws and regulations

The main similarities found within the Environmental Management Systems of both standards include:

- Commitment to Sustainability: Both the FSC Standard and ISO 14001 demonstrate a strong commitment to sustainability and environmental responsibility.
- Environmental Policy: They require organizations to develop and uphold an environmental policy that reflects their commitment to environmental preservation.

- Risk Management: Both systems require the identification and assessment of environmental risks, along with the implementation of measures to minimize or mitigate or eliminate these risks.
- Continuous Improvement: Both FSC and ISO 14001 emphasize the importance of continuous enhancements in environmental performance.
- Legal Compliance: Both systems require organizations to adhere to all relevant environmental laws and regulations.

The main differences found within the Environmental Management Systems of both standards include:

- Scope: The FSC Standard is strictly related to responsible forest management, while ISO 14001 has a broader scope and is suitable for all types of organization.
- Product certification: FSC provides certification for forest products, ensuring their responsible origin, an aspect not covered by ISO 14001.
- Stakeholder involvement: FSC prioritizes involving stakeholders, such as local communities and indigenous peoples, in forest management decisions, whereas ISO 14001 is less specific in this aspect.
- Industry-specific requirements: ISO 14001 is more generalized, allowing organizations to tailor requirements to their industry's specifics. In contrast, FSC imposes more specific requirements for forest management.

Both the FSC and ISO 14001 standards are valuable for organizations committed to responsible and sustainable environmental practices. The company's selection of the FSC Environmental Management System is justified by the nature of Project Alpha's Forest Management activities, their objectives, and the system's scope of application

4.2.9. Accommodation for Workers

At Project Alpha, there is an ongoing project to renovate the housing units for employees situated at the farm's headquarters. Additionally, there are older houses distributed across various parts of the farm, previously used by workers attending to the cattle. According to the plan, these houses will be closed down once cattle ranching activities are over by the end of the third quarter of 2023. Regarding the use of the lodgings, there is a document outlining coexistence and hygiene regulations for residents, based on NR-31 guidelines. Additionally, IST 004 addresses health and safety aspects in the workplace. It is important to note that renovations are already underway for the lodgings and other buildings that will continue to be in use, ensuring they meet the established standards outlined in the procedure.

In addition to the forestry implementation activities, there are established procedures focusing on occupational health, safety, and the work environment for the workers. These procedures are outlined in the following work instructions: IST001 (Food), IST002 (Sector Inspections), IST003 (Potability), and IST004 (Occupational Health and Safety).

The Food work instruction outlines the technical specifications for facilities and food handling, both in cafeteria settings and field environments. It specifies the necessary service conditions and determines transportation methods. To develop this work instruction, regulations such as Ordinance No. 326, of July 30th, 1997, Resolution No. 275, of October 21st, 2002), Ordinance No. 518, of 2004, Resolution RDC No. 216, of September 15th, 2004 - Health Surveillance, and NR 24 items 24.3, 24.4, 24.6 were referenced.

The Sector Inspections work instruction specifies the inspection frequency for each sector, along with details about accommodation and working conditions. It also outlines procedures for recording and addressing deviations or non-conformities. The company's internal procedures serve as a reference in establishing these protocols.

The Potability work instruction offers guidance on evaluating the quality of water intended for human consumption across various work areas.

The Occupational Health and Safety work instruction outlines the procedures that service providers need to follow concerning documentation and compliance with legal requirements. It details the necessity of conducting audits, their frequency, and the associated responsibilities. Additionally, it defines the standards for work facilities and provides communication guidelines. The instruction also specifies internal regulations for machinery transit and handling, outlines protocols for handling accidents and caring for the injured, describes the proper use of Personal Protective Equipment (PPE) across all activities (including those involving hazardous chemicals), sets criteria for vehicles used in transporting people, and details emergency protocols for incidents involving chemicals and venomous animals.

4.2.10. Phaseout

The company has specific procedures and work instructions for communicating with stakeholders in situations involving the phaseout of contractors or internal teams. Such scenarios may emerge due to automation projects, mechanization, economic downturns, or strategic decisions by the companyF, potentially impacting the structure of contractors or involved communities. The guideline governing this process is identified within the management system as ISG 029 - Demobilization.

The phaseout process involves various stages, such as conducting stakeholder meetings, employee interviews, offering guidance, and facilitating the transition between companies. It includes support for job market relocation and guidance on unemployment insurance for employees. Throughout this process, all involved employees receive support and assistance.

4.2.11. Implementation Costs

The table below presents the estimated costs for implementing all of Project Alpha's activities.

Table 4-1 – Implementation Costs for Project Alpha.

Item	USD
Overhead Costs	347,362,145
Silvicultural Costs	776,303,721
Reforestation Costs	865,384
CAPEX	16,131,991

4.2.12. Expansion Schedule

The company's long-term plan establishes a 14-year horizon, aiming to define the areas for planting and covering approximately 14,621 hectares over this period, ensuring the regulation of timber supply (refer to the table below).

Table 4-2– Annual Planting Plan

Annual Plan	%	ha
2023	21%	3,000
2024	27%	4,000
2025	27%	4,000
2026	25%	3,621
Total	100%	14,621

This long-term planning encompasses various aspects of forestry activity, starting with the company's strategic plan. Within this context, potential business scenarios are delineated, strategic objectives are defined, and the necessary guidelines to achieve these objectives are outlined.

Moreover, an annual plan has been established for the Commercial Planting of Eucalyptus. It includes the allocation of 21% of the total planned area (approximately 3,000 hectares) in 2023, 27% in 2024 (approximately 4,000 hectares), 27% in 2025 (approximately 4,000 hectares), and 25% in 2026 (approximately 3,621 hectares). This culminates in a total planting area of 14,621 hectares by the end of the specified period.

5. EXAMINATION OF ALTERNATIVES

5.1. LOCATION ALTERNATIVES

Selecting a site for a eucalyptus plantation relies on gathering and analyzing specific data. Key considerations include land availability and its monetary value, aligning with anticipated financial returns. Each location presents its own set of advantages and disadvantages, and the company believes that the chosen site for this project fulfills these criteria.

Today, the state of Mato Grosso do Sul is attractive to the forestry business due to available land that has been converted into pasture, along with prices that are more competitive than those found in the Southeast and South, for example. The state has less restrictive legislation compared to other states regarding forestry projects, is relatively close to consumer centers such as São Paulo, has a connection to waterways (Paraná River Waterway), and has successfully attracted wood-consuming companies within its boundaries, also offering a tax advantage.

In view of the above, it is understood that the chosen site, Project Alpha, is suitable for the intended activity. Project Alpha itself meets the basic requirements, possessing the necessary extension, relief, climate, and occupation history that suggest it is a suitable location for forestry activity. A noteworthy reference is that the property had previously hosted another successful forestry investment.

The cultivation of eucalyptus is widespread in Brazil, and the table below indicates other potential areas for new plantations.

Table 5-1– Brazilian states and their respective regions with suitable areas for planting eucalyptus and implementing silviculture.

Northeast	Central-West	Southeast	South	North
Bahia	Goiás	Minas Gerais	Santa Catarina	Tocantins
Maranhão	Mato Grosso	São Paulo	Paraná	
		Espírito Santo	Rio Grande do Sul	

It is worth noting that the cost of land can be a hindrance in the states of São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul. In the state of Minas Gerais, northern lands may be more attractive in terms of cost. According to IBA (2021), the states of Minas Gerais, São Paulo, Mato Grosso do Sul, Paraná, Rio Grande do Sul, and Santa Catarina are the main producers of planted forests in Brazil.

5.2. TECHNOLOGICAL ALTERNATIVES

This section will present innovations and technological alternatives that address environmental and social demands, along with the project's financial return. The use of technology aims to preserve both workers and ecosystem services, promoting sustainability. Technological alternatives presented encompass concepts of minimizing waste and ensuring the conservation of the environment and workers. Additionally, it is suggested to adopt treatments exclusively in problematic areas, moving away from applying the same treatment across the entire plantation. Processes that could benefit from improvement include plantation nutrition, protection, and maintenance.

Today, the goal is to be prepared for climate change, which is likely to alter the current conditions of plantations. Concerns about a potential water crisis have prompted the development of eucalyptus clones that can withstand periods of drought without compromising production or adversely affecting investments. This matter holds particular significance for the company because temperatures in the state of Mato Grosso do Sul are predicted to rise by up to 5.8°C by 2071. Therefore, the company must pay careful attention to this issue, given that production cycles are scheduled to last 16 years.

Other alternatives to be sought concern the reduction of inputs, employing the concept of precision forestry. Within this approach, data on soil fertility and foliar analysis of the trees are collected. The need to add fertilizers in precise measurements for a group of trees is determined, avoiding standardized fertilizer applications across the entire stand, for example.

Precision forestry is also highly valuable for detecting disease outbreaks. By utilizing drone and satellite images, it becomes possible to identify pest attacks through different wavelengths. This enables quick and precise intervention with fewer chemical products, minimizing potential harm to the environment and the health of workers. These actions contribute to environmental protection in various aspects. For instance, by applying less fertilizer, there is a reduced strain on mineral fertilizer sources, decreasing the generation of hazardous waste and its packaging by agrochemical, insecticide, and herbicide manufacturers. Moreover, there's a concurrent reduction in transportation, leading to savings on fuel and maintenance and, in turn, aiding in the preservation of the environment.

Continuing the discussion on processes employed in forest protection activities, the utilization of biological and genetic agents is a practice that yields benefits by substituting hazardous products with those that have minimal impact on the environment in which they are applied. For instance, biological control involves the introduction of specific parasitic insects. In this method, insects or bacteria specialized in infecting a group that is causing harm to the forest's development are released into the environment. This form of control is already widely adopted in agriculture, silviculture and citrus farming.

One of the most costly stages during the forest implementation is irrigating the seedlings. This activity is typically time-consuming and exhausting, especially when performed manually or semi-automatically, requiring workers to irrigate the plantations on foot, under the sun.

Another area for potential improvement is the assessment of input storage near the work fronts. Through this decentralization, there would be less transport movement than currently observed, resulting in environmental benefits for soil conservation at Project Alpha, which is susceptible to erosion. Continuing the discussion on soil conservation, the movement of machinery and equipment can contribute to erosion. Therefore, seeking equipment that is less harmful to the soil is part of environmental conservation measures.

5.3. NO PROJECT ALTERNATIVE ANALYSIS

In order to understand the project's setting up process at Project Alpha, it is necessary to understand what would have happened if the project had not been conceived, developed and implemented. To achieve this, an exercise will be conducted to explore the hypothetical scenario in the absence of the project, aiming to understand the areas of both direct and indirect influence.

As for the farm itself, cattle breeding will persist until the current owners find a buyer. This is because the current owners inherited the farm and its activities, reside in another state, and have no intention of managing the cattle farm. Consequently, if the property remains in the hands of its heirs, the areas with Pinus would suffer from neglect, leading to pest attacks, the death of trees, and other issues. Notably, areas left without maintenance are more susceptible to fires. Additionally, preserved areas could undergo changes due to seed dispersal from anthropized areas, causing alterations to the natural environment.

As for the Legal Reserve area, it would be maintained but no longer protected from potential fires or invasions for hunting and collecting specimens of fauna and flora. The Permanent Preservation Area (APP), in particular, would be more susceptible to impacts, as it is not a fenced area. There is a possibility that cattle would begin to traverse the APPs for grazing and accessing water from the watercourses, leading to changes in vegetation, soil compaction, and the expansion of grassy areas. In contrast, the pasture areas would serve as cattle feed until exhausted, and after depletion, the soil would be left bare, initiating erosion and desertification processes that are difficult to reverse.

The employees who worked on the farm would probably remain in their jobs, but with the farm's tendency to decline, positions would gradually be phased out until only a few remained. Access routes and roads would no longer be maintained, impacting current traffic conditions and making it difficult for people in the surrounding areas to move around.

Based on the above inferences, we can draw conclusions regarding the potential environmental and social impacts in case the company's project at Project Alpha had not been conceived, developed and executed:

- **Possible Environmental Impacts:**

    - Degradation of pinus areas: Without proper maintenance, the pinus areas already planted on the farm would be susceptible to pest attacks, tree mortality, and increased fire risks. This could lead to the loss of vegetation, potentially impacting biodiversity and ecosystems.
    - Alteration of conserved areas: Conserved areas on the farm could undergo changes due to seed dispersal from anthropized areas, resulting in alterations to the natural environment. This might affect the composition of vegetation and potentially impact local fauna.
    - Legal reserve less protected: The absence of effective protection for the Legal Reserve would render the area more vulnerable to fires and invasions for hunting and collecting specimens of fauna and flora. This could lead to the degradation of these areas and the loss of biodiversity.
    - Impacts on Permanent Preservation Areas (APPs): Without fences to delimit the APPs, cattle could invade these areas for grazing and access to watercourses, leading to changes in vegetation, soil compaction, and the spread of grasses. This would affect the quality and integrity of the preservation areas.
    - Desertification of pasture areas: Due to continuous grazing leading to soil exhaustion, pasture areas would become susceptible to erosion and the desertification process, making future recovery difficult.

- **Possible Social Impacts:**

  - Job losses: The decline of the farm would entail a gradual reduction in jobs, leading to unemployment for the farm's employees. This, in turn, would impact their income and overall economic well-being.
  - Decaying access roads: The lack of maintenance on the farm's roads and access routes would result in deteriorating traffic conditions, posing challenges for people in the surrounding areas to move around. This would affect access to essential services and resources.
  - Abandonment and degradation of facilities: Over time, the farm's facilities, including buildings and equipment, would be abandoned and could deteriorate, resulting in property losses and visual degradation of the site.
  - Indirect impact on local communities: The decay of the farm could also indirectly affect local communities that depend on economic activities related to the farm, such as the provision of goods and services. Reduced economic activity in the region could harm the local economy.

6. DEFINITION OF THE AREAS OF INFLUENCE

The delimitation of the study areas, as provided generically in CONAMA Resolution No. 01/86, for both the natural environment (physical and biotic) and the anthropic environment (socio-economic), took into account prior knowledge of the area where the project is located and, consequently, an understanding of the extent of the potential socio-environmental impacts on the territorial compartments of each subsystem (physical, biotic, and socio-economic).

For this environmental study, the study areas were divided into:

- Area of Indirect Influence – AII.
- Area of Direct Influence – ADI.
- Directly Affected Area – DAA.

The definitions and criteria for delimiting the study areas are presented below, tailored to the specificities of each subsystem and the scales of analysis. This aims to better harmonize and compartmentalize the approaches taken throughout this environmental study.

It should be noted that some of Project Alpha's activities extend beyond the established boundaries of the DAA, ADI, and AII. They are activities related to the transportation of cattle during the activity's set up and the transportation of timber during the operation. These two activities cover large areas and cannot be delimited, as it is not possible to define all the routes used. Nevertheless, Chapter 8 mentions some of the impacts of these access routes and roads, emphasizing that they need to be considered, along with proposed mitigating actions.

6.1. DIRECTLY AFFECTED AREA

The Directly Affected Area (DAA) is defined as the entire 24,119-hectare area within the boundaries of Project Alpha. Within this expanse, the specific area of interest comprises 17,071 hectares, designated for reforestation and forestry activities. Among this total, 2,450 hectares (10%) are earmarked for forest recovery, while 14,621 hectares (61%) will be utilized for forestry purposes. Upon completion of the forest recovery efforts, Project Alpha will boast a native forest area spanning 8,994 hectares, accounting for 37% of the total land.

6.2. AREA OF DIRECT INFLUENCE

6.2.1. Physical and Biotic Environments

The Area of Direct Influence (ADI) of the Physical and Biotic Environments delineates the Directly Affected Areas (DAA) of the project. It corresponds to the territorial portion that may directly experience the impacts on the natural environment, leading to modifications in its quality or a reduction in its conservation potential.

The northern boundary of the ADI is defined by the fragments adjacent to the DAA of plantations and the headwaters of Engano Stream and Forquilha Creek. To the west, the ADI coincides with the AII, but its southwestern boundary is oriented roughly by the interfluve between the Éguas Creek and an unnamed tributary to the south, connecting to the Verde River upstream of the AII's southern boundary. This point is near the confluence of the Água Limpa Stream with the Verde River itself.

The ADI is projected to the southeast, east and northeast in order to encompass the connectivity of forest fragments and to skirt the headwaters of unnamed tributaries of the aforementioned Água Limpa Stream and the Cabeceira da Onça Stream. It extends to the fragment of plantations adjacent to the DAA in its northeastern portion, ensuring the inclusion of this fragment within the ADI.

6.2.2. Socio-economic environment

The Area of Direct Influence (ADI) of the Socio-economic Environment for the project encompasses the entire region directly impacted by the implementation and operation of the eucalyptus plantation on Project Alpha, including the transition from pasture to forest.

The areas adjacent to the Project Alpha, including both the quilombola community of Santa Tereza and the Santa Bárbara community, were considered to be ADI. Additionally, urban centers in the municipalities of Camapuã, Costa Rica, and Figueirão, along with the connecting stretches of roads from these municipalities to Project Alpha, were also considered part of the ADI.

In this context, the Area of Direct Influence (ADI) encompasses not only the immediate farmland but also the surrounding areas where the direct impacts of Project Alpha's operations are most evident. These areas extend beyond the farm itself and include landscape elements such as rivers, lakes, forests, neighboring agricultural lands, local communities, conservation areas, and others directly affected by the farm's activities.

The urban center of Camapuã was chosen as the Area of Direct Influence (ADI) because a significant portion of Project Alpha's tax revenue contributes to the municipality. Consequently, the municipality will be affected by the shift in taxation resulting from the transition from the sale of livestock to the sale of forestry products.

Similarly, the urban centers of Figueirão and Costa Rica were designated as part of the ADI due to their proximity to the project and the accommodation of workers in these municipalities. Hence, these two municipalities are considered susceptible to potential direct impacts arising from both the stay of workers and the presence of other individuals, including the company's clients and suppliers

Although situated more than 17 km away from Project Alpha, the urban center of Figueirão has been designated as an Area of Direct Influence (ADI) due to the accommodation of some of the employees hired by Project Alpha within the municipality. Notably, Figueirão, emancipated in 2005, has a population of approximately 3,500 (Census 2022). The influx of new employees is expected to alter the dynamics of the municipality, potentially impacting housing, health, commerce, education, and other municipal services.

Similarly, the urban center of Costa Rica will also host workers from Project Alpha. However, the perceived impacts, though similar to those in Figueirão, are anticipated to be of lower magnitude. This is attributed to the better infrastructure in the municipality and the considerable distance of over 50 km between Project Alpha and the urban center of Costa Rica.

In this context, a 1 km buffer zone has been established around Project Alpha, encompassing residents and landowners who live or work near the farm area. Additionally, the urban center of the municipality of Figueirão and the stretch of the MS-442 highway linking Project Alpha to the municipality of Figueirão are considered part of the Area of Direct Influence (ADI).

The 1 km buffer comprises the area where individuals who directly interact with Project Alpha live and work. This interaction is due to: i) proximity, ii) the use of side roads from Project Alpha for travel to nearby municipalities, and iii) the utilization of water resources from springs in and around Project Alpha. This delimitation was established due to the anticipated change in the economic dynamics of Project Alpha, where the eucalyptus plantation is set to replace the pasture area. Such a transformation could potentially give rise to uncertainties and questions among residents. These concerns may stem from both the specific nature of the reforestation activity and the movement of people and vehicles in and around Project Alpha.

Finally, the road stretches linking the Project Alpha to the municipal centers of Figueirão, Camapuã, and Costa Rica have been taken into consideration. These stretches are designated as part of the Area of Direct Influence (ADI) because they will be utilized for the disposal of trees from Project Alpha, as well as for transporting and relocating the project's workers to their lodgings in Figueirão and Costa Rica. Specifically, the MS-422 highway from the junction with BR 0-60 in Camapuã to the junction with the MS-436 near Figueirão has been included. Additionally, the stretch from the MS-223, connecting the urban center of Figueirão to the urban center of Costa Rica, has been considered.

6.3. AREA OF INDIRECT INFLUENCE

6.3.1. Physical and Biotic Environments

The areas of influence that were used in the diagnosis of the physical and biotic environment were defined according to the level of interference and potential impacts due to the implementation and operation of the project.

The delimitation of the project's areas of influence was based on watersheds. There is a vast literature on the effectiveness of watersheds as a subdivision for environmental analysis, primarily because, as pointed out by Albuquerque (2012), watersheds enable the connection of physical and biotic elements. The connectivity of large plantation fragments, native forests, and the geographic dispersal dynamics of wildlife groups is also taken into account.

Even when river basins are treated as subdivisions, it is necessary to assess the project's environmental analysis at an appropriate scale.

In conformity with the literature mainly used in environmental studies to designate Areas of Influence, we considered working with the boundaries of multi-level ottobasins. ‘Ottobasin’ is a method of hydrologically coding river basins developed by the Brazilian engineer Otto Pfafstetter. This coding system considers the area of contribution of the drainage sections of a water basin.

The Pfafstetter system follows a hierarchy and begins with the largest rivers in the basin (assigned the lowest numbers), progressing to a more detailed level and hierarchy until the entire drainage area has been analyzed. The higher the level of the ottobasin, the greater the detail of the contributing area for that stretch. The database used was provided by Brazil’s National Water and Sanitation Agency (ANA).

The database used was made available by Brazil's National Water and Sanitation Agency (ANA) on the metadata portal, accessible at https://metadados.snirh.gov.br/. This database is the Ottocoded Hydrographic Database of the Paraná River Basin, published in 2018. As mentioned earlier, this is a file with multi-level basins.

To tailor the scale most effectively to the project, we used level 5, specifically the Verde River Basin (Ottobasin level 5). The Verde River flows into the Paraná River, approximately 300 km southeast of the project. The Paraná River, in turn, flows into the Prata River, which ultimately flows out into the Atlantic Ocean.

The Area of Indirect Influence of the natural environment corresponds to the area actually or potentially affected by the indirect environmental impacts generated by the project.

For the Area of Indirect Influence (AII) of the Physical and Biotic Environments of the project, we considered the Ottobasin of Verde River as Level 5 - downstream of the project's drainage area at Project Alpha. In other words, we sought to define this unit of analysis using the micro-watersheds that cover the drainage area around the project, using the Verde River Basin as a reference.

The delimitation of this physiographic portion comprises the terrain near the extreme upstream limits of the entire Level 5 Ottobasin of the Verde River Basin. For better comprehension, it's important to note that the Verde River Basin flows from north (upstream) to south (downstream) and covers more than 2 million hectares (ANA, 2018). In contrast, the Area of Indirect Influence (AII) covers just over 87,000 hectares and is situated very close to the northern limit of the Verde River Basin (approximately 20 km).

Specifically, the AII is designated to the north by a projection between the vegetation fragments adjacent to the DAA in its extreme northeastern portion, extending westward to skirt the Engano Stream watershed. It then connects at its bridge to the northwest, at the headwaters of the Forquilha Creek. At this point, the AII intersects the Verde River, upstream of the project area.

The delimitation of the AII to the west is defined by a projection between the aforementioned point to the northwest and the southern boundary of the AII. This projection aims to encompass the micro-basins of the contributing watercourses to the right bank of Verde River (which flows in a southerly direction). These watercourses include an unnamed tributary, the Éguas Stream, and three other unnamed tributaries. The southern boundary of the AII is determined by the confluence of Verde River and Mutuquinha Stream, the latter being a tributary on its left bank

From the southern boundary of the Area of Indirect Influence (AII), it extends eastwards to incorporate the contiguous vegetation fragments located immediately east of the Area of Direct Influence (ADI), utilizing a dirt road as a delimitation anthropic element, forming its southeastern boundary.

Finally, its eastern boundary consists of a projection between the aforementioned vegetation fragments and the contiguous plantation fragment belonging to the ADI at its northeastern end, connecting to the northern boundary of the DAA. This projection, designated for the AII to the east, includes the micro-basins of Catingueiro Stream, Cabeceira da Onça Stream, Água Limpa Stream, and Cascalho Stream, all contributing streams on the left bank of Verde River

The Area of Indirect Influence encompasses a physiographic portion totaling 87,474 hectares.

6.3.2. Socio-economic environment

The Area of Indirect Influence considered comprises the three municipalities that border Project Alpha: Figueirão, Camapuã, and Costa Rica.

This Area of Indirect Influence covers the geographical space where indirect impacts are most evident, encompassing areas adjacent to Project Alpha in the municipalities of Figueirão, Camapuã, and Costa Rica. These areas are indirectly affected by the farm's operations

The analysis of Potential Indirect Impacts aims to identify effects that could extend beyond the Area of Direct Influence of the farm. An example is the potential impact of agrochemical use on the water quality of nearby rivers, or how the expansion of forestry and reforestation might influence the loss or gain of habitat for wildlife.

Figure 6-1 – Areas of Influence of the Physical and Biotic Environments – Project Alpha.

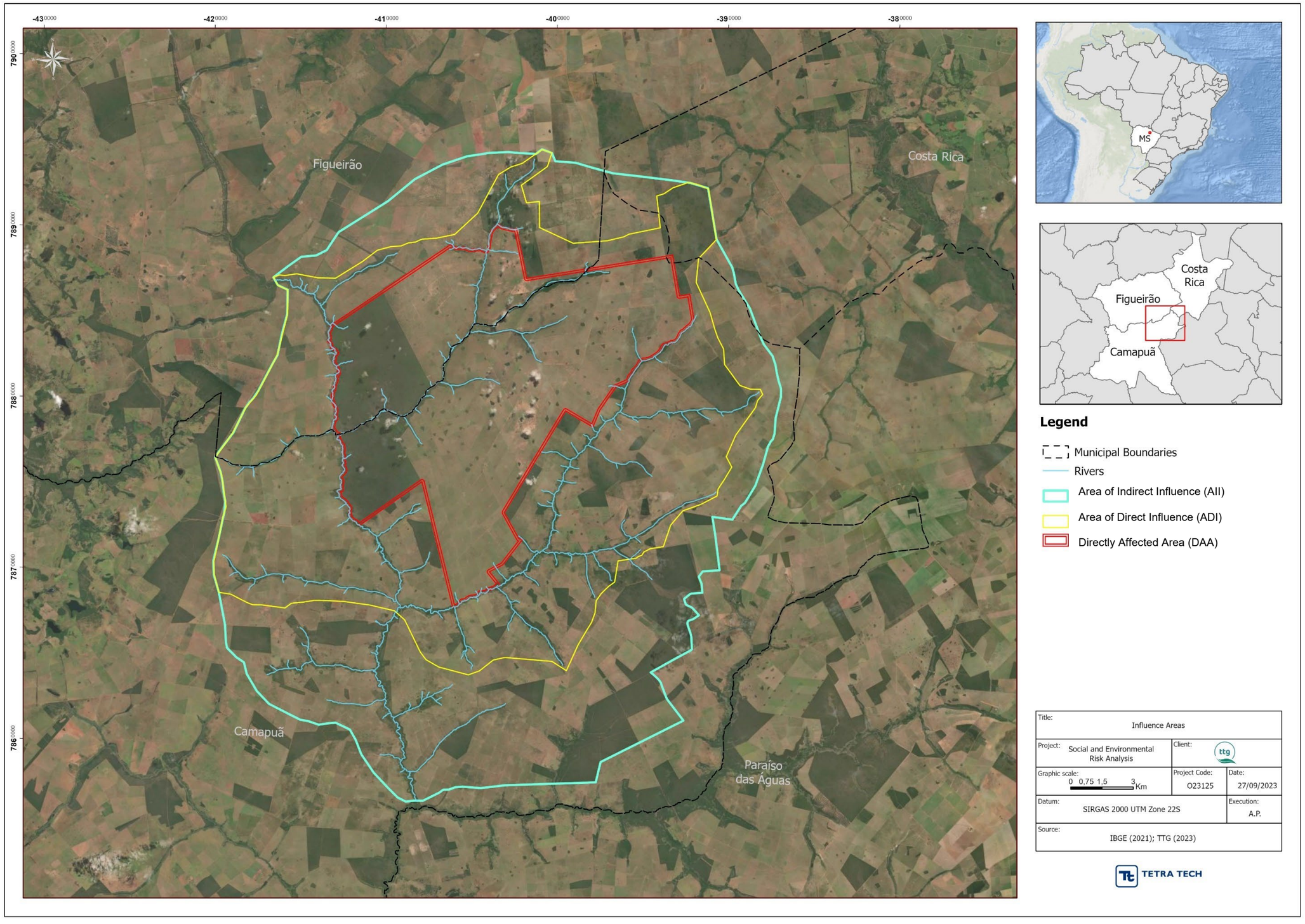
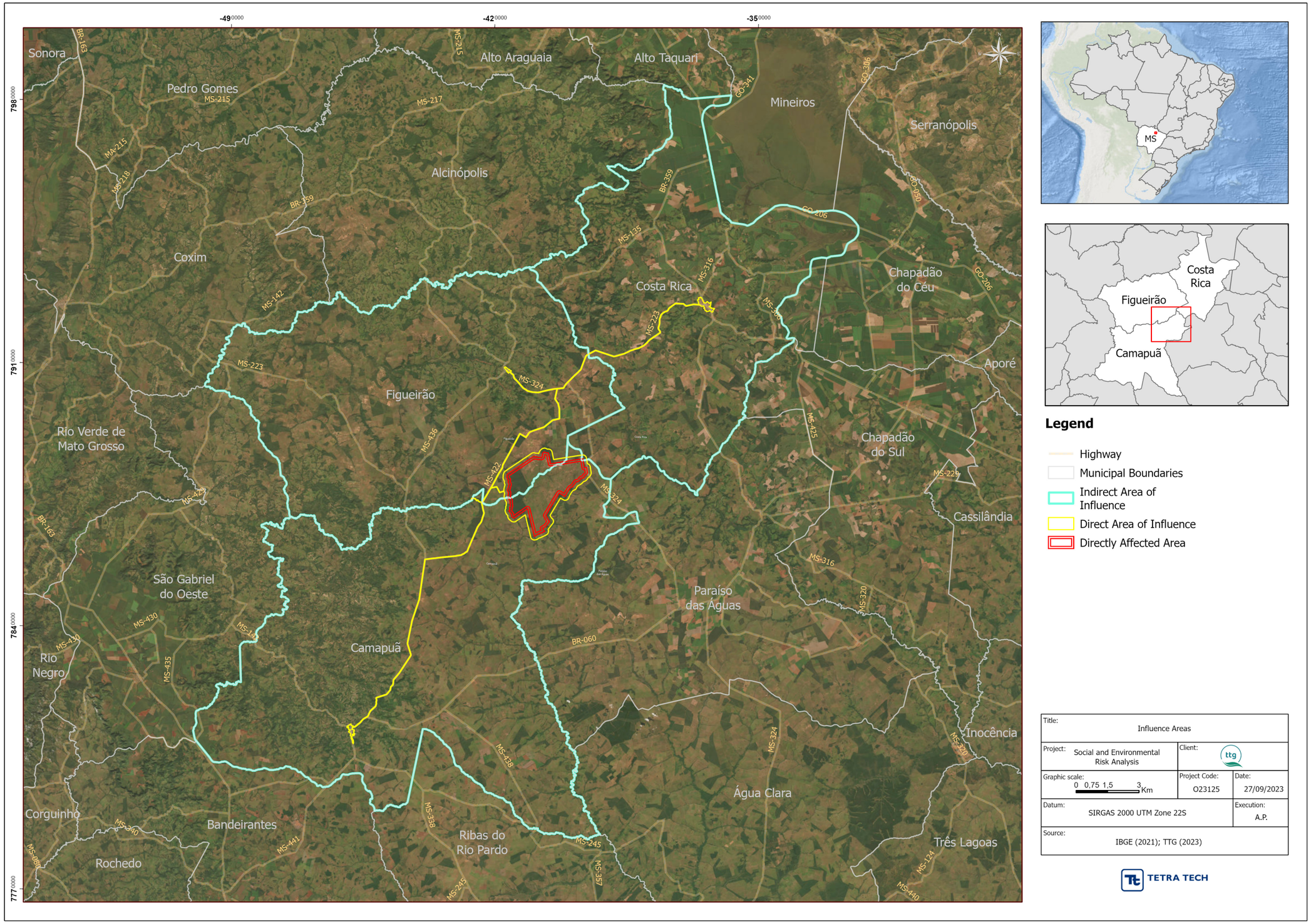


Figure 6-2 – Areas of Influence of the Socio-economic Environment – Project Alpha



7. BASELINE CONDITIONS IN AREA POTENTIALLY AFFECTED BY THE PROJECT

7.1. PHYSICAL ENVIRONMENT

This characterization aims to understand environmental processes related to the physical environment, with an emphasis on following themes: Climate; Climate Change and Greenhouse Gases; Geology and Natural Resources; Geomorphology; Soils and Erosion Processes; Surface and Groundwater Resources.

The characterization was drawn up mainly based on secondary data, including the following documents:

- *ENVIRONMENTAL ASSESSMENT - BL09, ALPHA Project, BTG Pactual - Timberland Investment Group LCC*, June 2022. Document assessing social and environmental aspects, prepared by RBG Conhecimento.
- *Alpha Project Report - Impact Readiness*, a document prepared by the NGO *CONSERVATION INTERNATIONAL Brazil,* in June 2022.
- Environmental Monitoring Technical Report - Results of the Water Resources Monitoring Program - Project Alpha, December 2022. (SOLUFLOR, 2022).
- Management Plan According to the Principles and Criteria of the FSC - Forest Stewardship Council, drawn up by TTG BRASIL INVESTIMENTOS FLORESTAIS, in June 2023. (TTG Brazil, 2023)

Other references to secondary data used for this environmental diagnosis are presented throughout the text.

7.1.1. Weather

The climatic regime of a region is shaped by the average conditions of the overall atmospheric circulation, in addition to regional and local topographical factors. The geographical location of Project Alpha, in conjunction with the collective influence of major atmospheric systems in the region, defines the local climate and weather conditions.

According to the Köppen-Geiger climate classification, the climate in the Project Alpha region is characterized as tropical with dry winter - climate group typology 'Aw'. The 'A' indicates a tropical climate, while 'w' indicates that the driest season occurs in winter.

In Mato Grosso do Sul, Project Alpha is situated in an area considered to be a climate transition zone, influenced by various air masses, which leads to thermal contrasts both spatially and temporally (SEPLAN, 1990 *in* TTG Brazil, 2023).

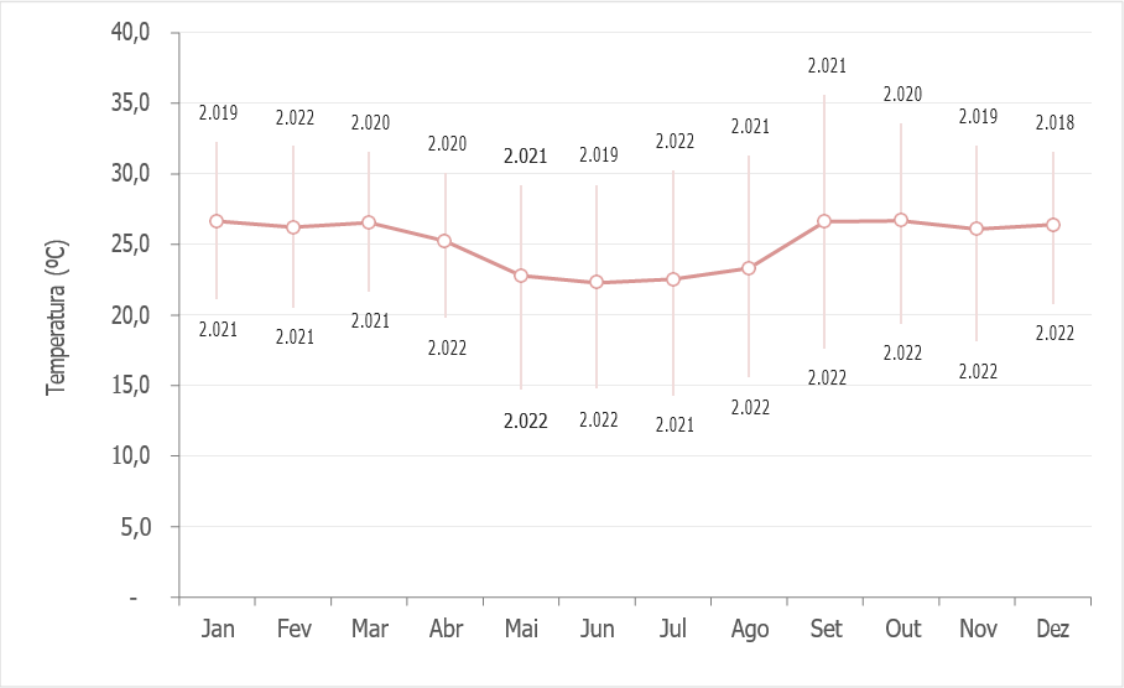
During the summer, from December to March, the area experiences high temperatures and high humidity. Average maximum temperatures can reach around 32°C, with minimum temperatures hovering around 22°C. This season is characterized by frequent and intense rainfall, with January being the wettest month. The average annual temperature is around 23°C. The climate is drier in winter, from June to September, with average maximum temperatures ranging between 25°C and 28°C, and minimum temperatures potentially reaching 10°C. Precipitation is low during this period, with minimal rainfall.

To provide historical meteorological data for temperature and rainfall, information extracted from the 'Environmental Monitoring Technical Report - Results of the Water Resources Monitoring Program - Project Alpha,' dated December 2022 and prepared by Soluflor, was utilized. This report incorporates data from the Automatic Weather Stations of INMET – Brazil's National Institute of Meteorology, situated in the municipalities of Camapuã and Figueirão.

Concerning the **temperature**, an assessment of this parameter involved compiling data on the 5-year average temperature (°C) for the period 2018-2022 within the compartments of Project Alpha.

Figure 7-1 displays the average monthly temperature values, illustrated by the orange curve, and records the year in which the maximum and minimum temperature values occurred for each month.

Figure 7-1- Graph displaying the average monthly temperature for the five-year period 2018-2022, indicating the years in which the maximum and minimum temperatures were recorded during this timeframe.



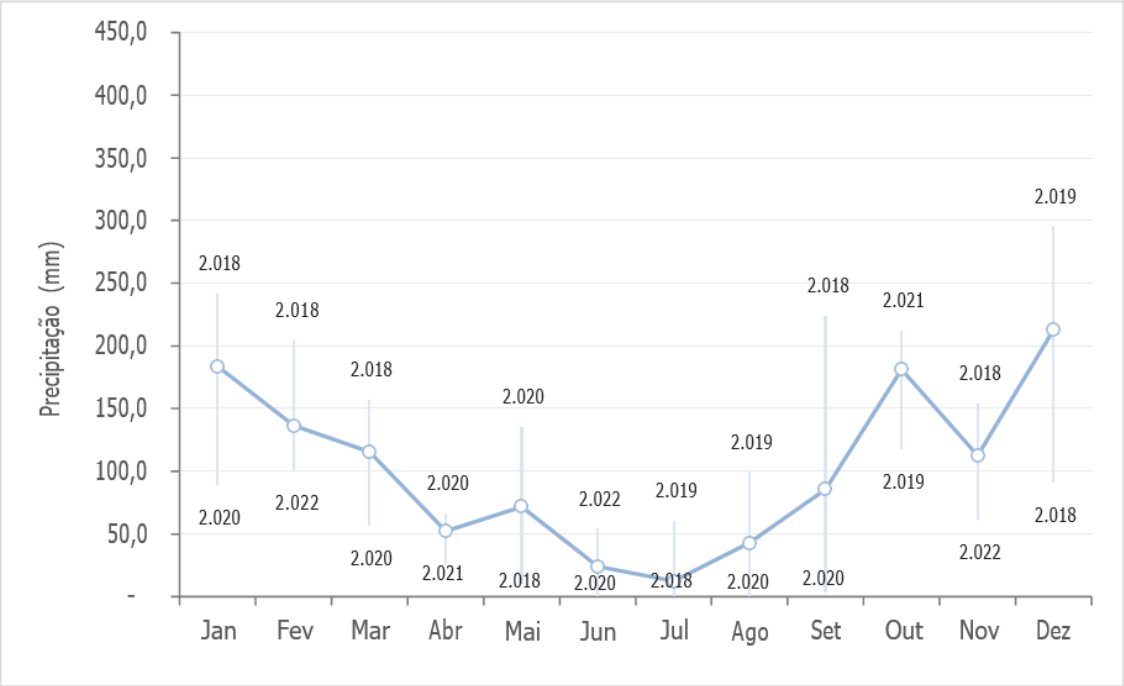
Source: Soluflor (2022).

With regard to **precipitation**, to assess the behavior of this parameter, data on the 5-year historical average of precipitation (in mm) within the compartments of Project Alpha was also compiled, covering the period 2018-2022.

Figure 7-2 below displays the average rainfall values per month, represented by the blue curve. Additionally, the year in which the maximum and minimum rainfall values occurred over the last five years for each month is indicated.

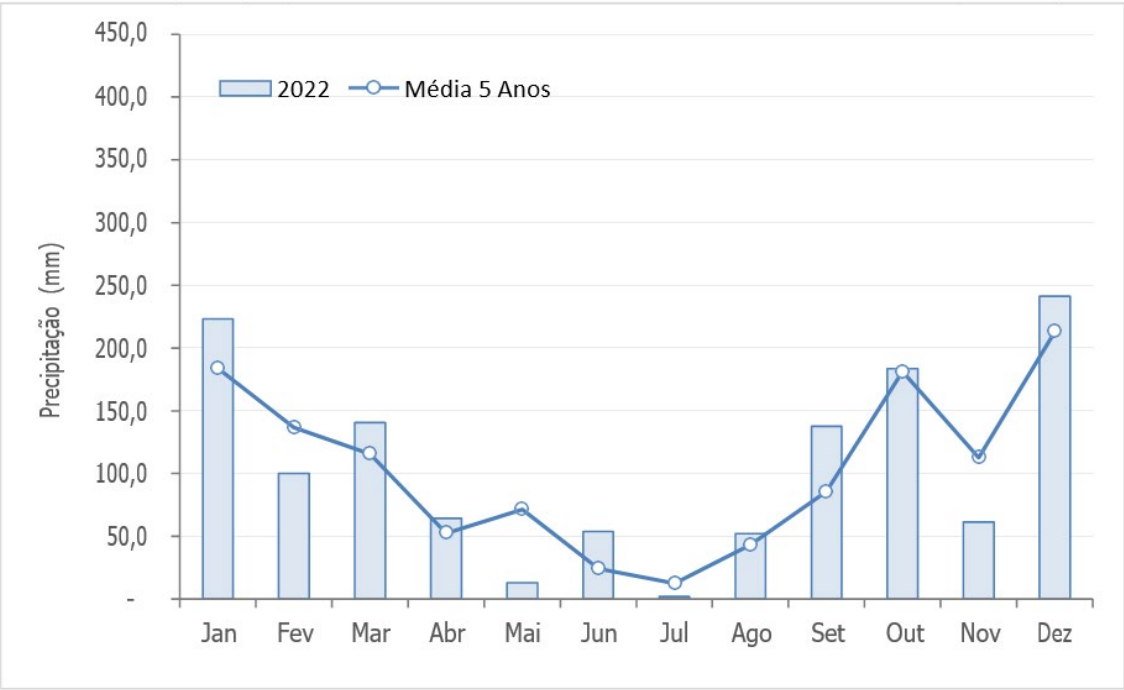
Based on the rainfall data for the twelve months of 2022, **Figure 7-3** illustrates the precipitation over a one-year period in the Camapuã region, comparing it with the historical average for the five-year period.

Figure 7-2- Graph displaying the historical average monthly rainfall for the five-year period 2018-2022, indicating the years in which the maximum and minimum average monthly rainfall were recorded.



Source: Soluflor (2022).

Figure 7-3- Graph displaying the average monthly rainfall for the year 2022 and historical average for the five-year period.



Source: Soluflor (2022).

It can be observed that the months with the lowest rainfall are in the period from April to September when the minimum rainfall approaches zero. This period coincides with the days of the year when the temperature is at its lowest, and seasonal drought occurs. Historically, the region where Project Alpha is located experiences well-distributed rainfall, with the highest peaks occurring in December.

7.1.1.1. Monthly Climatic Water Balance

Considering that the subject of this environmental study is the cultivation and management of eucalyptus stands at Project Alpha, this section provides data from the Monthly Climatic Water Balance, which is available for consultation on the INMET – Brazil's National Institute of Meteorology website through the SISDAGRO platform.

SISDAGRO, as defined by INMET, was developed to assist users in the agricultural sector with decision-making, supporting agricultural planning and management. Its target audience includes rural producers, extension workers, agricultural technicians and agronomists, agrometeorologists, and government managers involved in implementing public policies for the agricultural sector.

Furthermore, according to the institution, the product provided by the Monthly Climatic Water Balance utilizes the classic method proposed by Thornthwaite & Mather (1955), widely acknowledged in specialized literature. The key data inputs for this model are precipitation (P) and reference evapotranspiration (ETo). The ETo is calculated using the Penman-Monteith method, as parameterized by Allen et al. (1998) for a standard crop, usually grass.

SISDAGRO offers water balance evaluations by month and by decade for 1,447 weather stations distributed throughout Brazil. Among these, 301 are conventional stations (21%), 443 are automatic stations (31%), and 703 are virtual stations (48%), generated from a regular grid with a spatial resolution of 15 km.

The virtual stations were integrated into INMET's data collection between 2020 and 2022, as outlined in the document 'INMET Management Report 2020-2022' from the Ministry of Agriculture, Livestock and Supply; Secretariat for Innovation, Social Development and Irrigation; National Institute of Meteorology.

According to INMET, the virtual stations are created using information available from the institution, interpolated into grid points with a horizontal resolution of 0.5º latitude x 0.5º longitude. These virtual stations allow users to access the same parameters as automatic and conventional weather stations. The data from the interpolated numerical model undergoes a second level of integrity checks for meteorological information before being used in a parametric insurance index.

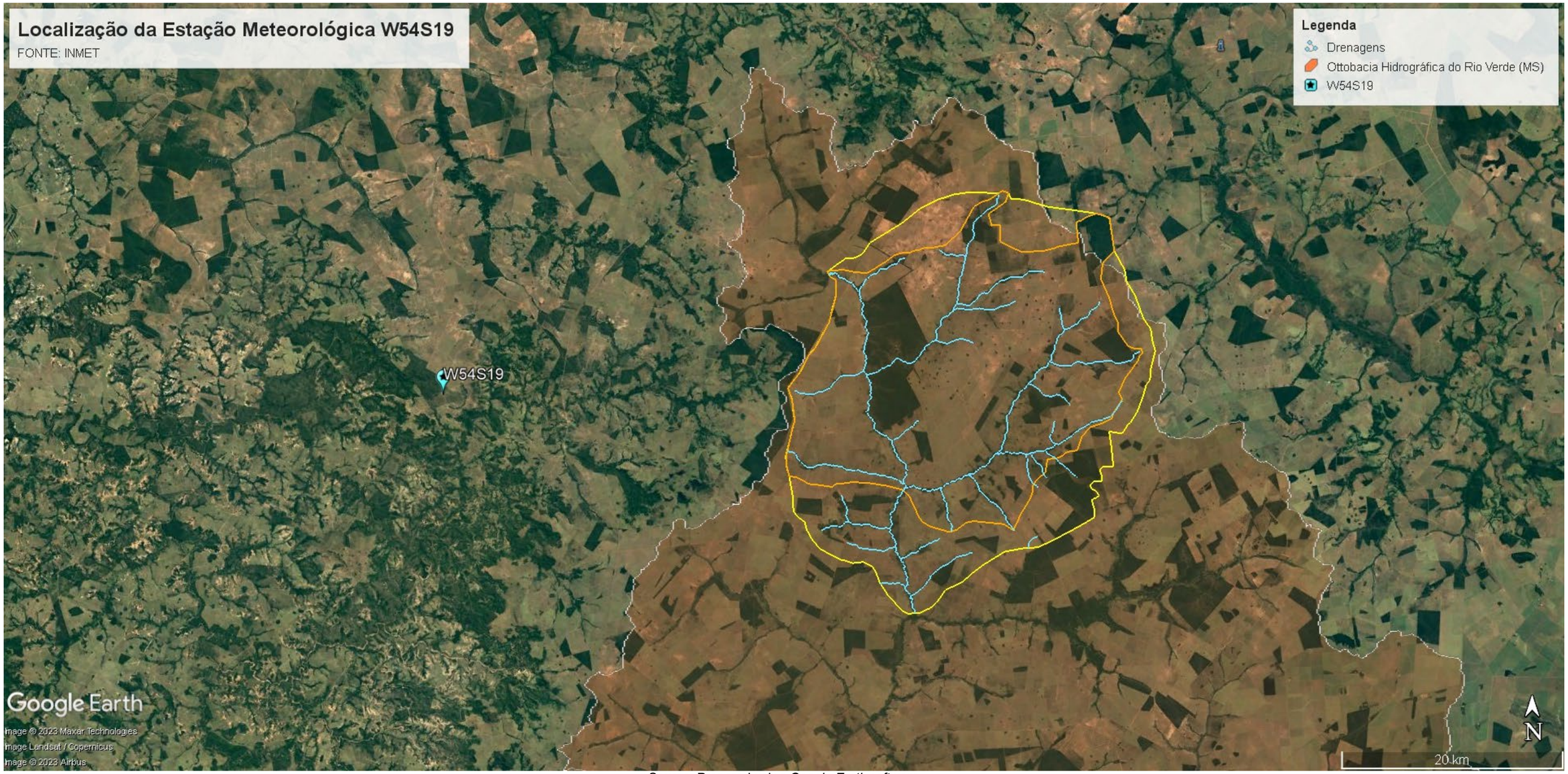
The results provided by the virtual stations were processed based on historical data series for a 30-year period (in this case, 1981-2010), which provides parameterized values based on time intervals used to designate climatological normals. Additional information on the Virtual Stations can be found in the aforementioned 'INMET Management Report 2020-2022,' accessed in September 2023 and available for consultation at:

https://portal.inmet.gov.br/uploads/notastecnicas/Relatório-Gestão-Final_um.pdf.

The weather station consulted was 'W54S19,' the closest to the enterprise, with coordinates 184,136 UTM X and 7,896,479 UTM Y. **Figure 7-4** illustrates the location of the virtual station.

As mentioned above, this study presents the water balance for Station W45S19. The water balance provides key outputs, including real evapotranspiration (ETr), variations in soil water storage, and water deficit (WD) and water surplus (WS).

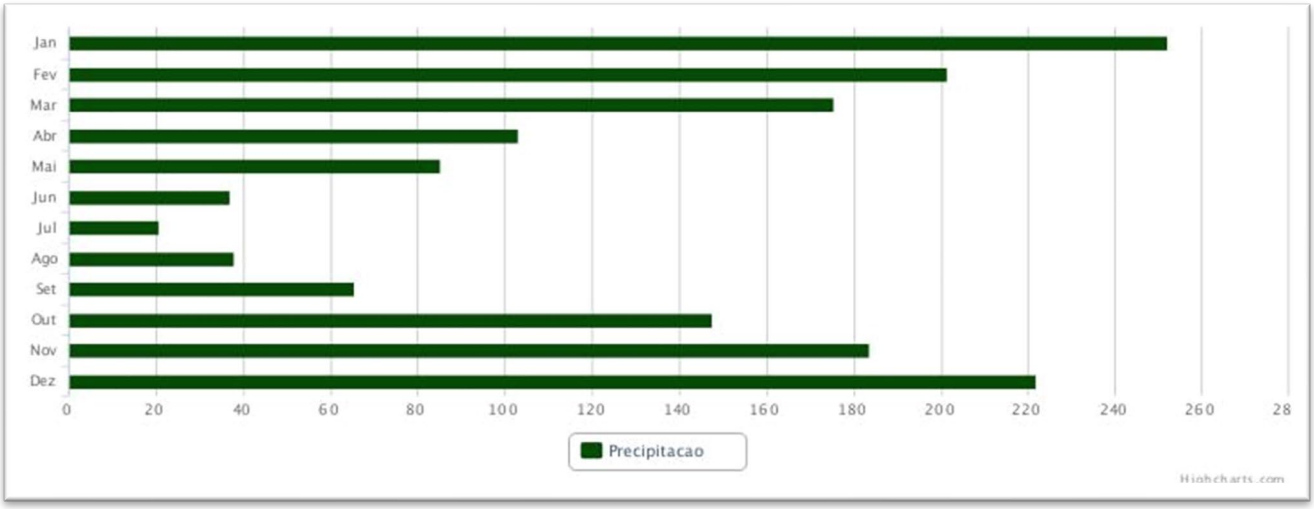
Figure 7-4- Location of Weather Station W54S19 in relation to the undertaking. The orange line indicates the Area of Direct Influence, while the yellow line indicates the Area of Indirect Influence (Physical and Biotic Environments). The Verde River Hydrographic Ottobasin is shown in orange shading and the weather station W54S19 is represented by the blue icon.



Source: Prepared using *Google Earth* software

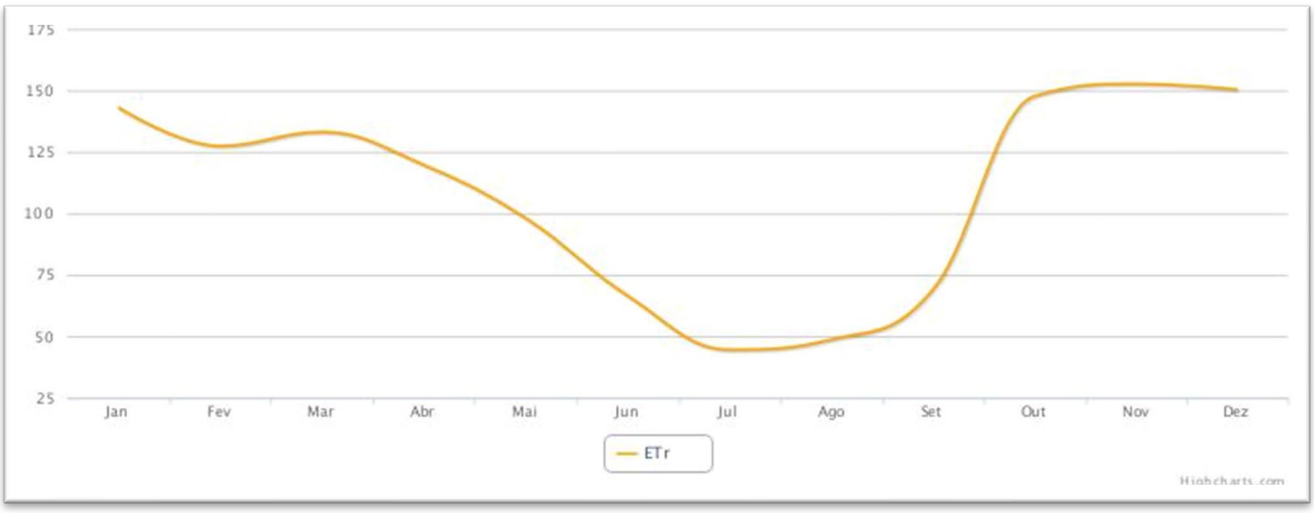
The following graphs illustrate the Water Balance for this station, considering that they are based on historical series over a 30-year period (1981-2010). The values are in millimeters (mm), the unit used to measure rainfall, where 1 millimeter is equivalent to 1 liter of rainwater on a surface area of 1 square meter.

Figure 7-5- Precipitation (mm) - Station W54S19 - 1981 to 2010. Monthly average values



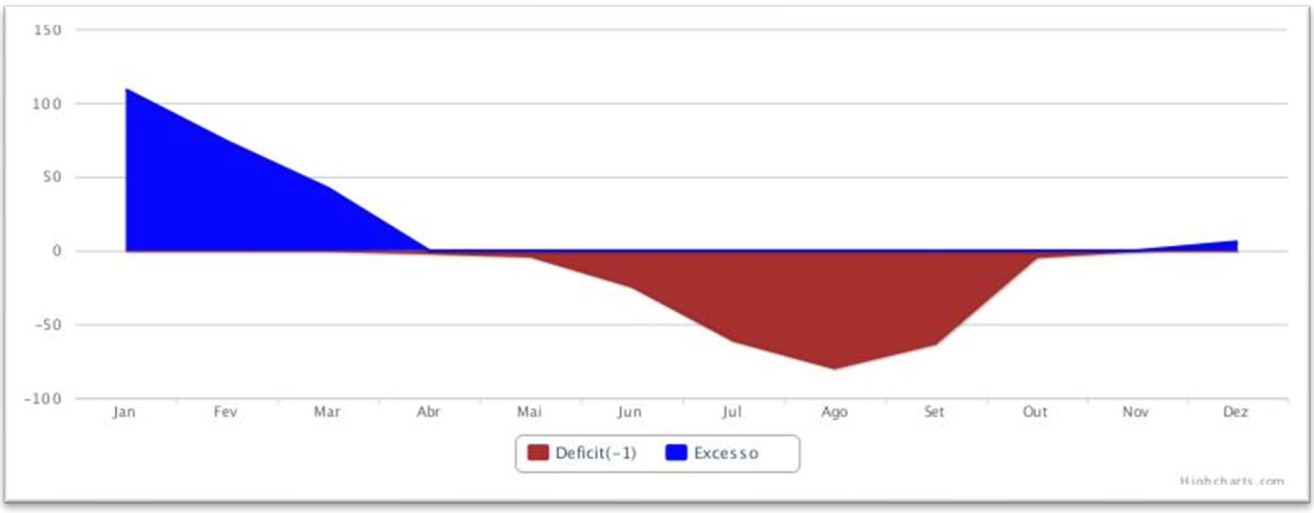
Source: SISDAGRO/INMET

Figure 7-6- Real evapotranspiration (mm) - Station W54S19 - 1981 to 2010. Monthly average values



Source: SISDAGRO/INMET

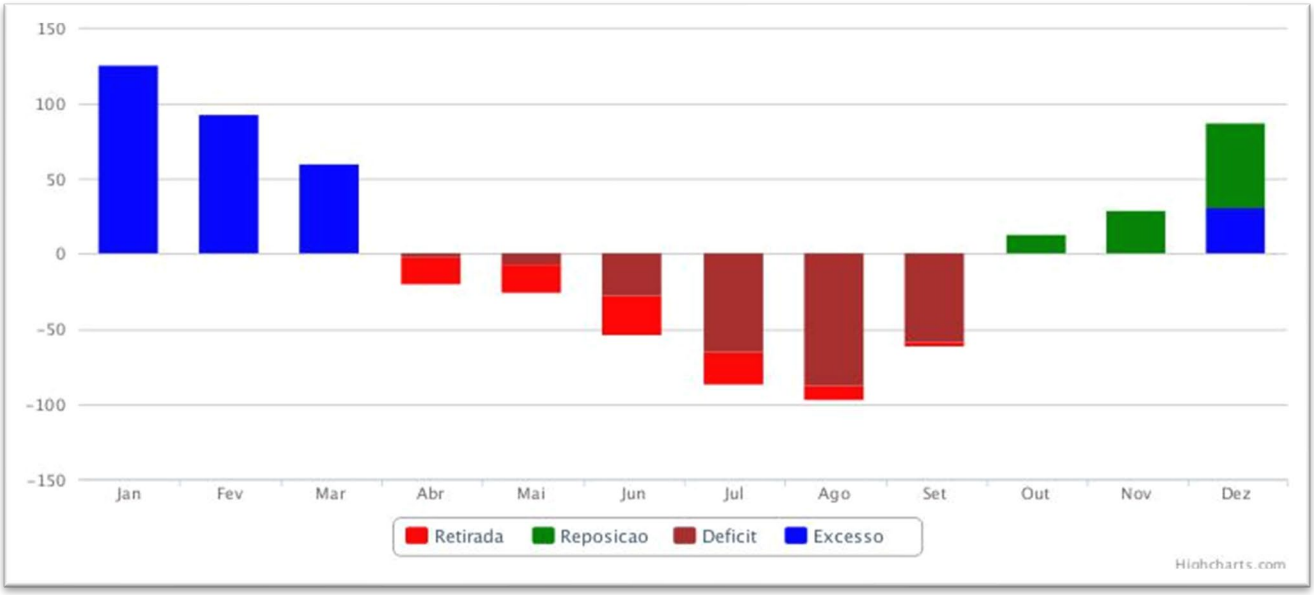
Figure 7-7- Water Deficit (mm) x Water Surplus (mm) - Station W54S19 - 1981 to 2010. Monthly average values



Source: SISDAGRO/INMET

The compilation of the data presented in the previous graphs is reflected in the Water Balance for the area, utilizing the methodology proposed by Thornthwaite & Mather (1955).

Figure 7-8- Monthly Water Balance - Station W54S19 - 1981 to 2010. Monthly average values (mm)



Source: SISDAGRO/INMET

The Withdrawal (red) of water from the system is the result of real evapotranspiration, while Recharge (green) is the product of precipitation. Water Deficit (dark red) occurs when water is insufficient for the full development of a crop, reducing the potential for agricultural productivity, while water recharge corresponds to the values that enter the system in order to meet the demand for agricultural productivity. Water Surplus (blue) occurs when the amount of water available exceeds the crop's needs.

Figure 7-8 illustrates that the highest water recharge levels in the system occur between October and March, reaching peak values in January. Conversely, June records the highest withdrawal month, and August exhibits the highest water deficit. In general, the region exhibits water inflow and outflow levels that tend toward equilibrium in an annual analysis.

For the enterprise in question, which involves the implementation, management, and administration of forestry, it is necessary to employ intensified irrigation during months of water deficit. Additionally, monitoring and calibration of crop irrigation should be conducted during months with water surplus, taking into account the stage of crop development. More information on silviculture can be found in Chapter 4.0 - Project Description.

7.1.1.2. Greenhouse Gases and Climate Change

This section aims to provide a brief overview of the main greenhouse gases and climate change, with a specific focus on agriculture. This emphasis is particularly relevant as one of the objectives of Project Alpha is to mitigate greenhouse gas emissions and contribute to mitigating anthropogenic impacts on climate change. This is achieved by replacing extensive livestock farming on pastures with forestry and silviculture.

The primary greenhouse gases are CH_4 (methane), N_2O (nitrous oxide), and CO_2 (carbon dioxide). The information in this section is sourced from data provided by the SEEG - System for Estimating Greenhouse Gas Emissions and Removals. SEEG, an initiative of the Climate Observatory, produces annual estimates of greenhouse gas (GHG) emissions in Brazil, along with analytical documents on emission trends. The Climate Observatory is a network of environmental organizations from Brazilian civil society dedicated to discussing the issue of global warming in the Brazilian context.

The Estimates of Greenhouse Gas Emissions and Removals are generated following the guidelines of the Intergovernmental Panel on Climate Change (IPCC). This is based on the methodology of the Brazilian Inventories of Anthropogenic Greenhouse Gas Emissions and Removals, prepared by the Ministry of Science, Technology, and Innovation (MCTI). Data is obtained from government reports, institutes, research centers, sectoral entities, and non-governmental organizations. The entire methodology can be consulted on the system's portal, available at https://seeg.eco.br/.

According to the latest report on the SEEG portal, titled 'Analysis of Brazilian Greenhouse Gas Emissions and Their Implications for Brazil's Climate Goals,' considering the period 1990-2020:

> "[...]
> *The increase in gross greenhouse gas emissions in Brazil in 2020 was 9.5%. In the year in which the Covid-19 pandemic brought the world economy to a halt and caused an unprecedented reduction of almost 7% in global emissions, the country went against the rest of the world, possibly becoming the only major emitter on the planet to see an increase. Total gross emissions reached 2.16 billion tons of CO_2 last year, compared to 1.97 billion tons in 2019. The level of emissions in 2020 is the highest since 2006*[1].
>
> *The main factor explaining the increase was deforestation, especially in the Amazon and Cerrado. Greenhouse gases released into the atmosphere as a result of changes in land use increased by 23.6%. This increase more than offset the significant drop in the energy sector, which, in the wake of the pandemic and economic stagnation, saw its emissions return to 2011 levels*.
> [...]"

Agriculture comprises one of the five main sectors responsible for Greenhouse Gas (GHG) emissions, alongside Energy, Land Use Change, Industrial Processes, and Waste.

According to the content of the aforementioned report, emissions from the agricultural sector in 2020 totaled 577 million tons of CO_2, representing a 2.5% increase over the previous year (562.9 million).

[1] Excerpt adapted from the original, available at <https://seeg.eco.br/2023/03/21/seeg-9-1990-2020/>

The Agriculture sector accounts for emissions from the digestion of ruminant animals, which produces methane (Enteric Fermentation), from the treatment and disposal of animal waste (Manure Management), from the cultivation of irrigated rice (Rice Cultivation), from the burning of agricultural waste resulting from the cultivation of sugarcane and cotton (Burning of Agricultural Waste), and from the management of agricultural soils, considering the increase in nitrogen through the use of agricultural inputs and operations (Managed Soils)[2].

The municipality of Camapuã/MS, where Project Alpha is located, was responsible for the emission of 1,255,019 tons of CO_2 in 2019 (the last available date for data consultation on the SEEG platform). This value encompasses emissions from the five sectors mentioned above, with Agriculture being the main emitting sector in the sum of emissions for the municipality of Camapuã.

When considering only Agriculture, it is possible to view more up-to-date data for 2021 through the quantitative spreadsheets available on the portal by filtering the options according to the specific greenhouse gas (GHG) in question. Exclusive data for the Agriculture sector, however, is only available at the state level, i.e. for Mato Grosso do Sul.

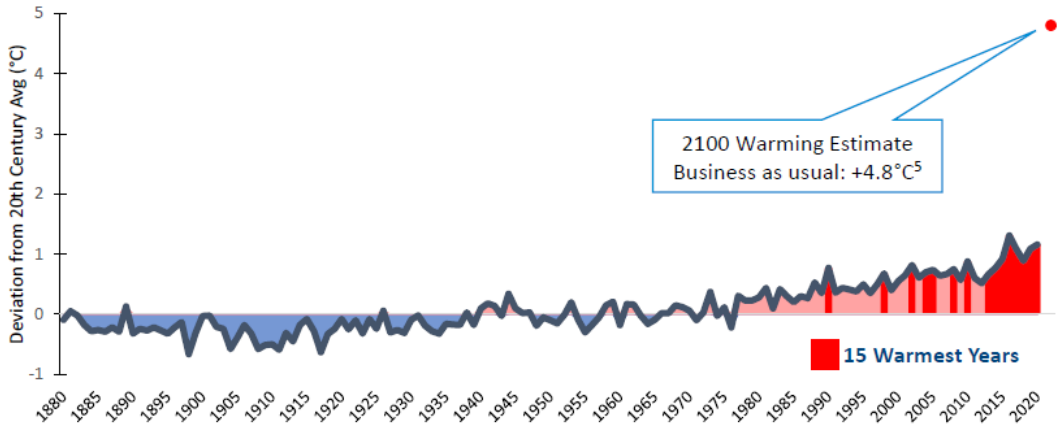
In the year 2021, when considering Agriculture alone, the state of **Mato Grosso do Sul emitted** 21,619 tons of Nitrous Oxide (N_2O), 1,151,359 tons of Methane Gas (CH_4) and 184,363,224 tons of CO_2.

The level of greenhouse gas emissions has a direct influence on the issue of climate change. Brazil is considered one of the countries where it is possible to implement the so-called 'NCS Opportunity', or 'Natural Climate Solutions Opportunity' – a term that can be applied to achieving the three objectives[3] of Project Alpha. These objectives include 'growing trees,' 'restoring forests,' and 'removing CO_2.' In this case, the approach involves replacing extensive livestock farming on pastures with the cultivation of forest stands and the restoration and protection of natural forests.

[2]Adapted from <https://seeg.eco.br/wp-content/uploads/2023/03/SEEG9_DOC_ANALITICO_2021_FINAL.pdf>
[3]Adapted analysis provided by TIG/TTG and BTG Pactual, August 2023.

Figure 7-9, reproduced from TIG's Technical Presentation (August 2023), illustrates the year-on-year increase in historical positive temperature anomalies and provides an estimate for the year 2100 if greenhouse gas emission levels remain unchanged.

Figure 7-9- Historical Global Surface Temperature Anomalies



Source: NOAA, Global Land and Ocean Temperature Anomalies Data and TIG Analysis, 2020. TIG/TTG and BTG Pactual, August 2023

Project Alpha encompasses a total area of 24,119 hectares, featuring approximately 15,140 hectares of grassland dedicated to extensive cattle breeding. It is perceived as an investment opportunity in the forestry industry, involving activities such as pulp production or metalworking, achieved through the cultivation of eucalyptus trees. Eucalyptus plantations are considered exemplary instances of 'Natural Solutions for the Climate' because, while maintaining the farm as a production unit that generates products and services, they substantially reduce greenhouse gas (GHG) emissions associated with cattle farming.

It is worth mentioning that Project Alpha, in addition to the forest stands, aims to promote the optimal allocation of land use to maximize the connectivity of natural habitats and enhance water quality in the streams that permeate the farm.

Out of the total 24,119 hectares, 2,599 hectares (10.77%) will be allocated for forest recovery, and 14,621 hectares (61% of the total) will be dedicated to forestry. After the completion of the forest recovery, Project Alpha will boast a total of 8,991 hectares of native vegetation (37%)

It is evident that the company's project at Project Alpha is a significant initiative aimed at reducing greenhouse gas (GHG) emissions and, consequently, contributing to mitigate climate change and address global warming.

7.1.2. Geology, Geomorphology, and Natural Resources

The information in this section has been primarily reproduced and/or adapted from the content available in TTG Brasil (2023), Soluflor (2022), and RBG (2022). Additionally, secondary data compiled by Lacerda Filho *et al.* was utilized, sourced from 'Geology and Mineral Resources of the State of Mato Grosso do Sul, CPRM' (2006).

The state of Mato Grosso do Sul is geotectonically composed of three distinct geotectonic units: the Amazon platform, the Paraguay-Araguaia metamorphic belt, and the Paraná sedimentary basin, which encompasses the area of influence of the project. Two structural groups are evident above these units: the first, older group, characterized by folds and faults, is situated in Precambrian terrain. The second group is located in Phanerozoic terrain within the Paraná sedimentary basin.

The Camapuã region, situated in the state of Mato Grosso do Sul, exhibits a geological composition characterized by the presence of sedimentary formations and rocks from the Cretaceous and Quaternary periods. This area forms part of the Paraná Sedimentary Basin, a geotectonic structure spanning several states and known for its sedimentary rocks

The region, within which the municipality of Camapuã is located, is predominantly composed of Cretaceous sedimentary rocks that accumulated over millions of years in a marine and lake environment. These sedimentary rocks consist of layers of sandstone, siltstone, claystone, and limestone, reflecting the deposition of sediments transported by rivers and seas when the region was submerged by an inland sea.

These sedimentary rocks play a crucial role in comprehending the geological history of the region and in harnessing mineral resources, such as limestone, essential for the construction and agricultural industries.

In addition to the Cretaceous rocks, the Camapuã region also harbors more recent sedimentary deposits from the Quaternary period. These deposits encompass alluvium, fluvial sediments, and colluvium, representing the outcomes of erosion and siltation processes that have unfolded over the last millions and hundreds of thousands of years. In summary, the geology of the Camapuã region is characterized by the presence of Cretaceous sedimentary rocks and Quaternary sedimentary deposits. These formations significantly influence soil composition, groundwater availability, and the extraction of mineral resources in the region.

In terms of lithostratigraphic units, the Caiuá Group is mapped within the Areas of Influence of Project Alpha, with specific portions identified as the Santo Anastácio Formation.

The **Caiuá Group** comprises a series of sedimentary rocks lithostratigraphically mapped from the south to the north of the state of Mato Grosso do Sul, exhibiting irregular distributions. According to CPRM (2006), it consists of red to purple Arcosean sandstones, bimodal (very fine and coarse), with angular to subrounded grains in the fine fraction and rounded grains in the coarse fraction, displaying variable sphericity. Selection is good in the fine fraction and moderate to good in the medium to coarse fractions

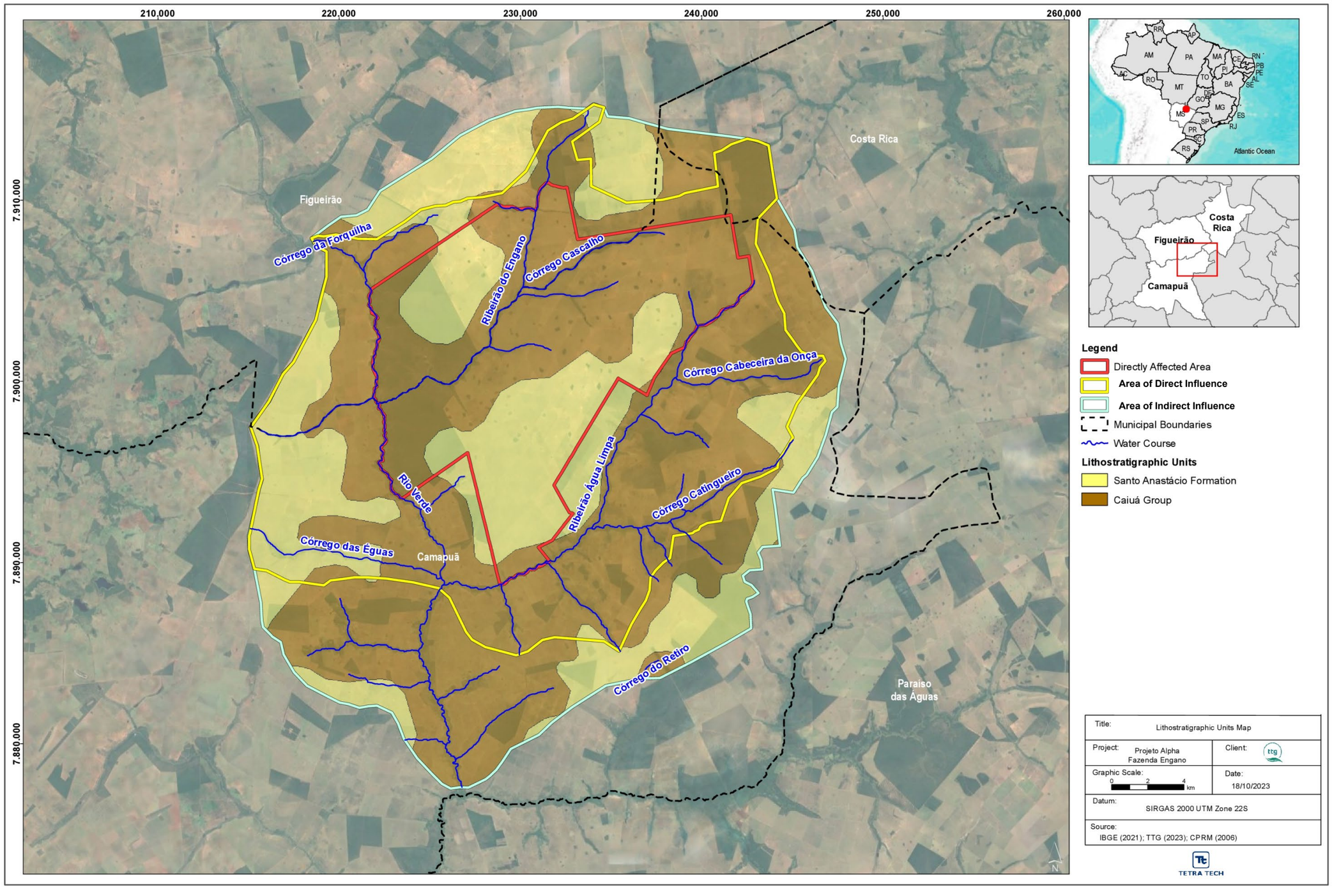
The predominant sedimentary structures are small to large tangential cross-stratifications and, secondarily, plane-parallel laminations. The depositional environment is interpreted as fluvial at the base and aeolian at the top.

According to CPRM (2006), the Caiuá Group is subdivided into the Goio-Erê, Paraná River, and Santo Anastácio formations. Among these, only the Santo Anastácio Formation has a cartographic record in Mato Grosso do Sul, specifically in the northeastern part of the state, where Project Alpha is located.

The **Santo Anastácio Formation** is described as a series of very fine to medium sandstones, not very clayey, poor in sedimentary structures, and interpreted as having been deposited in a meandering to intertwined fluvial environment. The outcrops are characterized by reddish-brown, fine to medium sandstones, poorly sorted, massive, friable, or silicified, with rare claystone intercalations.

The lithostratigraphic units mapped in the Areas of Indirect Influence, Areas of Direct Influence, and Directly Affected Areas are illustrated in **Figure 7-10**, according to CPRM (2006).

Figure 7-10– Lithostratigraphy under Project Alpha Areas of Influence



The essentially sedimentary lithostratigraphy of Project Alpha directly influences the characterization of elements such as landforms, soil types, erosion processes, drainage systems, and the behavior of surface and underground water, as well as the type of aquifer, among other attributes related to the physical environment.

In terms of Mineral Resources, a review of the mining rights database of the National Mining Agency - ANM[4] indicates no active mining processes at any stage within the boundaries of Project Alpha. There are also no records of areas that have been applied for at any time or that have any ongoing mining processes within the project's Areas of Influence.

According to RGB (2022), considering a buffer of 100 km from the Project Alpha polygon, the mineral resources prospected in this region correspond to gravel (gravel quarry), basalt, quartz, limestone, phosphate, granite, and manganese.

Regarding geomorphology, as stated by TTG Brasil (2023), the Camapuã region is characterized by the presence of extensive plateaus – elevated and relatively flat surfaces. These plateaus, primarily formed by Cretaceous sedimentary rocks, exhibit gently undulating topography as a result of erosive processes over time, which have leveled the surface.

In addition to the plateaus, the region also features hills and small mountain ranges. These elevations are distributed across different areas of the region, introducing variation to the relief and creating more rugged landscapes. Composed mainly of sedimentary rocks, these geomorphological forms result from differential erosion, where certain areas prove more resistant to erosion than others.

The Camapuã region is intersected by rivers, streams, and creeks, forming valleys that play a crucial role in the drainage of the area. Over time, these watercourses have carved out valleys, contributing to the creation of uneven landscapes. Rivers and their tributaries are instrumental in removing sediment and shaping the landform

The Camapuã region is also home to depressions and lagoons, lower areas susceptible to water accumulation. These depressions may result from soil subsidence processes or the presence of aquifers that rise to the surface.

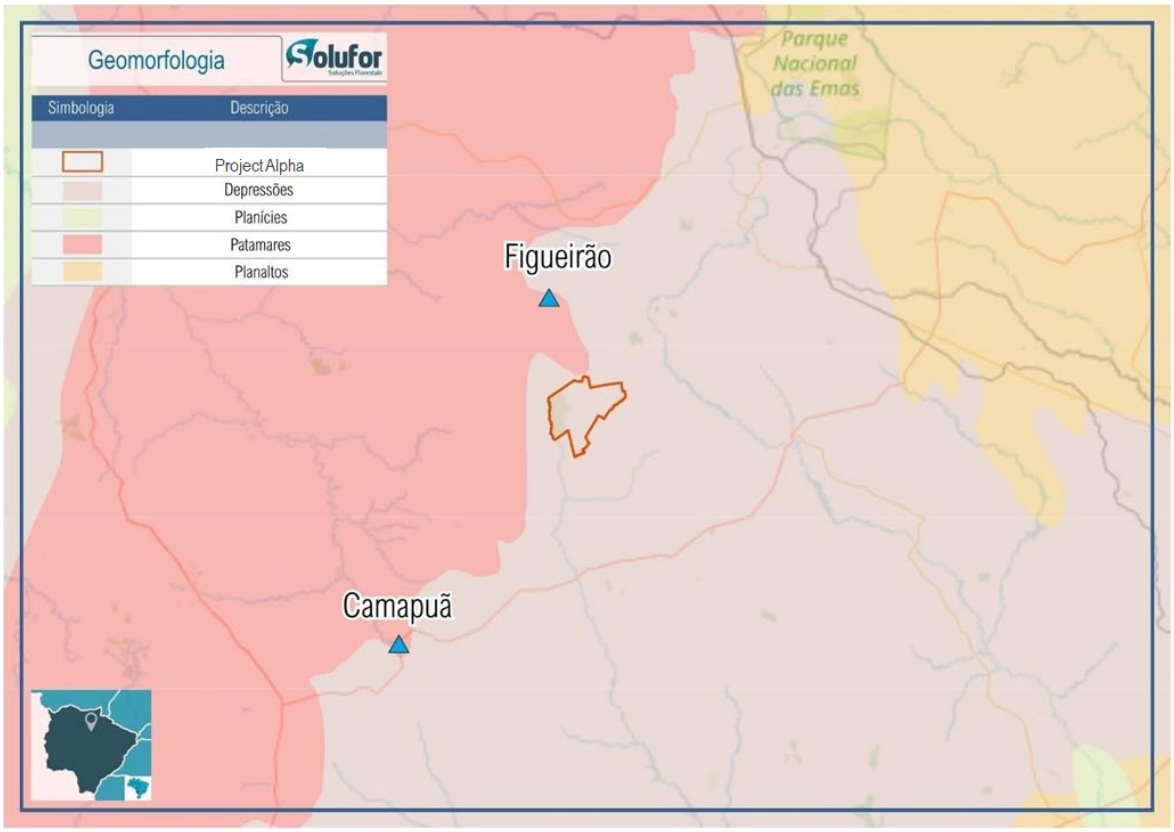
[4] Consultation carried out on the SIGMINE/ANM platform - *Geographic Information System for Mining*, available on the ANM website. Accessed October 2023.

In some areas, particularly near rivers and streams, depressions and floodplains can be found. These lower areas tend to accumulate water during periods of heavy rain. Depressions and floodplains play a crucial role in the hydrological balance of the region, providing habitats for the local fauna and flora.

In some areas, escarpments and ravines can be found, resulting from weathering and erosion. Escarpments are faults or steep slopes on hillsides, while ravines are deep furrows formed by rainwater erosion.

The following **Figure 7-11**, reproduced from Soluflor (2022), illustrates the landforms found around Project Alpha. The vector base used is available from IBGE at <https://mapas.ibge.gov.br/bases-e-referenciais/bases-cartograficas/geomorfologia.html>.

Figure 7-11- Landforms around Project Alpha



Source: adapted from Soluflor (2022).

According to the map drawn up by Soluflor, the relief of Project Alpha falls into the 'depressions' class, bordering the 'plateaus' class. In this case, the first relief form can be correlated with the Verde River watershed, while the plateaus correspond to the residual plateaus described in the region's geology. Hydrographically, these plateaus provide the drainage divide between the Verde River watershed and the surrounding drainage divide to the north and west.

7.1.3. Soil and Erosion

The soil of the Camapuã region is influenced by the geology and weathering processes of the sedimentary rocks. The predominance of sandy and clay soils is common in the region, directly affecting agricultural and livestock activities.

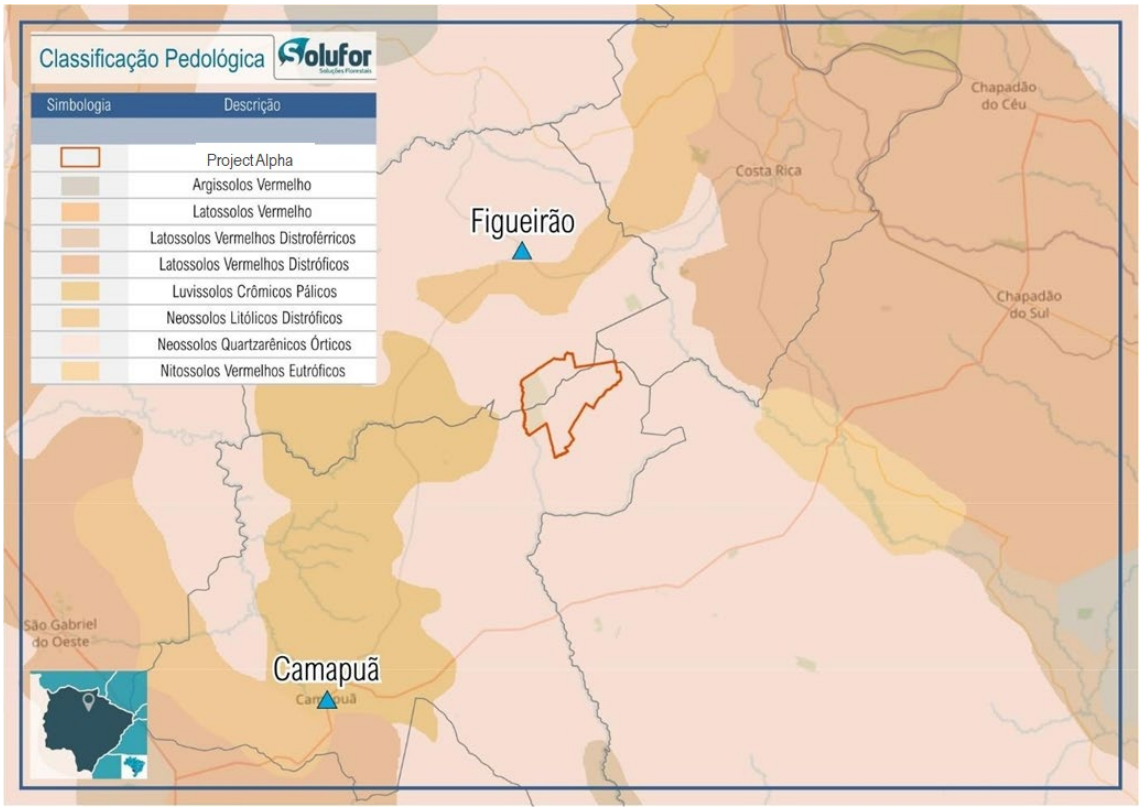
Although the slopes are not steep, the sandstone constitution of the upper portions of the terrain creates a potential for erosion processes. This potential is evident in the intensive road maintenance work carried out by the company in terms of soil conservation. The control measures implemented reduce erosive processes and mitigate the potential occurrence of siltation in watercourses.

This section will first present the pedological classification of the soils found in the study area, followed by an analysis of the erosion processes occurring in the area.

7.1.3.1. Pedological units

According to the 'Brazilian Soil Classification System,' Brazilian soils are categorized into thirteen different classes. Based on this classification, the Project Alpha property was overlaid onto a shape vector database of soil classifications provided by EMBRAPA[5] - the Brazilian Agricultural Research Corporation. The analysis of the overlap revealed that Project Alpha is situated on the Orthic Quartzarenic Neosol pedological unit (**Figure 7-12**).

Figure 7-12- Pedological units in and around Project Alpha.



Source: adapted from Soluflor (2022).

In terms of generic classification (EMBRAPA, 2021), neosol is considered a poorly developed soil typically found in areas with slopes and more rugged terrain. However, this characterization does not apply to Project Alpha. Neosol at this location is shallow with low water and nutrient retention capacity. While it may be less suitable for intensive agriculture, it can still be utilized for pasture or subsistence crops.

According to TIG, 'Neosol' refers to young soils in the early stages of formation. These soils are composed of mineral or organic material with limited thickness and lack a diagnostic B horizon, distinguishing them from other soil types such as Latosol, Argisol, or Gleisol.

[5] EMBRAPA, 2021. Available at: https://www.embrapa.br/busca-de-solos/-/solos/neossolos-quartzo-orticos.

Specifically, the term '**Orthic Quartzarenic Neosol**' indicates that these are sandy soils with greater depth compared to other types of neosols. It originates from the weathering of sandstone rocks in poorly eroded relief areas.

This description aligns with that provided by Embrapa (2021), available at <https://www.embrapa.br/agencia-de-informacao-tecnologica/tematicas/solos-tropicais/sibcs/chave-do-sibcs/neossolos/neossolo-quartzarenicos>, accessed in October 2023, as follows:

> *[...]*
> *"This class of soil is found on flat or gently undulating terrain, characterized by a sandy texture throughout the profile and a uniformly yellowish color below the A horizon, which is slightly darker. Considering the relief of occurrence, the erosion process is not highly pronounced, but caution is advised due to the essentially sandy texture.*
>
> *These soils, being deep, do not impose physical limitations on deep root development. However, the presence of an alic or dystrophic character restricts deep root growth, exacerbated by the limited availability of water (attributed to the essentially sandy texture). Levels of organic matter, phosphorus, and micronutrients are notably low, and there is intense nitrate leaching due to the sandy texture."*
>
> *[...]*

The paragraphs above, reproduced from EMBRAPA's website, provide a description that precisely aligns with the local pedology observed at Project Alpha. However, the company emphasizes the need to manage the environmental adversity posed by the susceptibility to erosion due to the essentially sandy texture of the soils in the area. The term 'ORTHIC' indicates 'no restrictions on use and management.' Lastly, EMBRAPA's website suggests that the 'soils are more suitable for reforestation.'

7.1.3.2. Erosion

As previously mentioned, this topic is a concern for Project Alpha due to the essentially sandy texture of the farm's soils and their vulnerability to sediment transportation during heavy rainfall events.

Currently, the company addresses and manages this concern, along with multiple other issues, through a series of identification, evaluation, procedures, and monitoring protocols. These are all systematized in extensive documentation established by various Work Instructions and Management Procedures.

Erosion involves the disintegration and removal of soil particles and/or rock fragments due to the combined action of gravity, water, wind, ice, and organisms. The environment of Project Alpha is characterized by erosion caused by river and rainfall action, and, significantly, by human activity. The latter is responsible for intensifying existing erosion or even generating new forms of erosion in the area.

Erosion can manifest as laminar, resulting from diffuse water runoff (unconcentrated runoff), which removes surface layers of exposed soils, or leaching, where concentrated rainfall runoff can cause furrows and gullies to form and develop into larger features. Areas with exposed soil and no vegetation cover are always prone to some form of erosion.

Figure 7-13 shows the sandy nature of the soil at Project Alpha during the excavation of an access opening. The company adheres to a set of procedural guidelines outlined in Work Instruction ISI 014 (Silviculture Instruction No. 014) for the proper handling and management of roads, access routes, and firebreaks. Additionally, a road maintenance report, known as the 'SGF Road Maintenance Report,' is maintained. In addition, a road maintenance report is also kept ('SGF Road Maintenance Report') which, up to April 2023, had 26 maintenance records.

Figure 7-13- Project Alpha - Sandy soils, low slope, flat to gently undulating, covered by pastures.



Additionally, it is worth noting the implementation of control through a spreadsheet that identifies points for sediment loading, soil compaction/structuring sites, soil removals, and uneven surfaces. These points are then related to each of the established Work Instructions. For context, this spreadsheet covers 116 other environmental aspects in addition to the four mentioned above.

Among these aspects, it is notable to mention IMA Work Instruction 003 - Soil and Water Conservation. This particular instruction focuses on the construction of culverts, water outlets, and containment basins on firebreaks, roads, and/or critical points within the stands. The primary goal is to prevent/minimize erosion on firebreaks/roads and the silting up of watercourses.

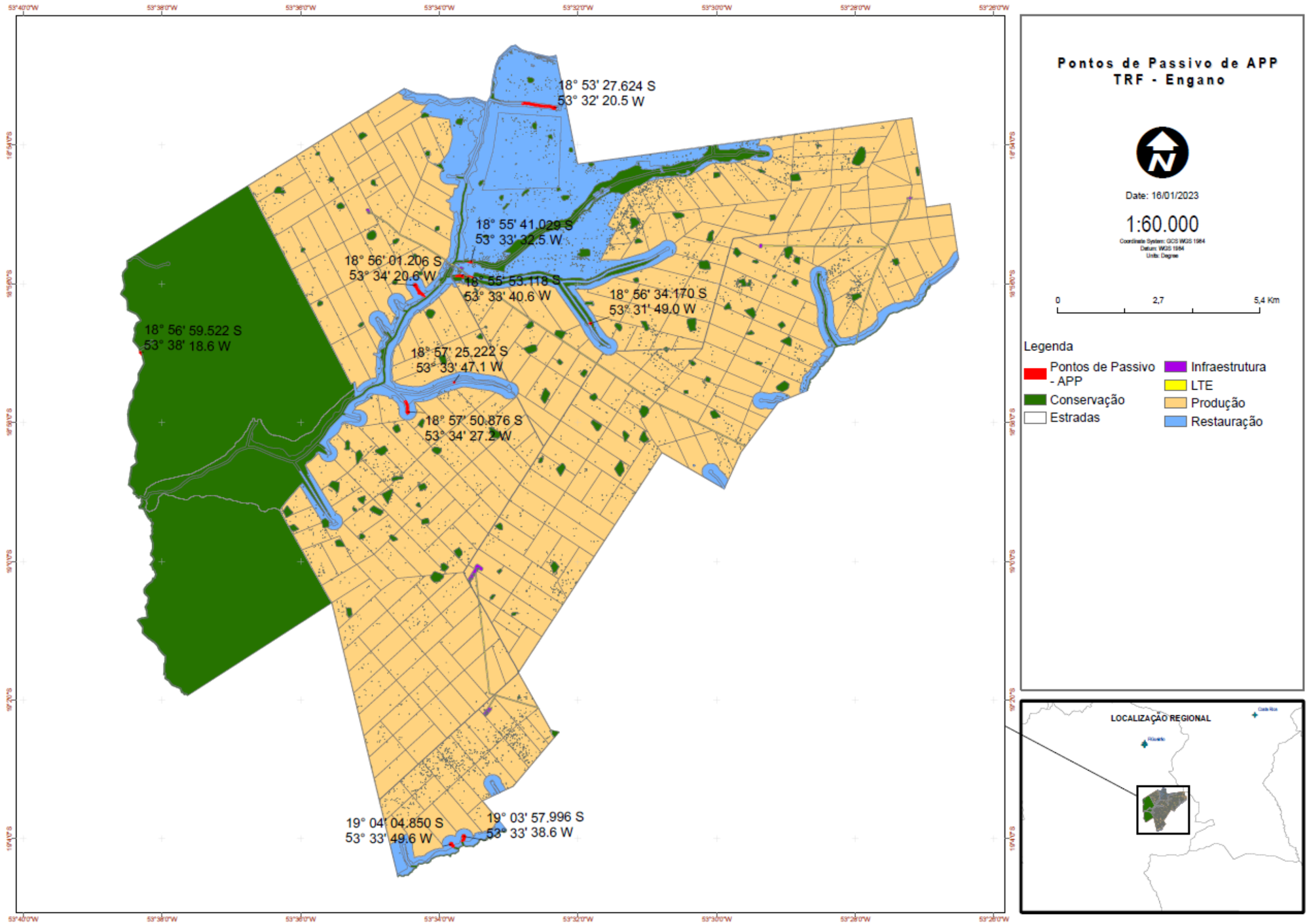
Specifically, the company has identified and intervened in 10 points susceptible to surface/fluvial rain erosion within drainage areas at Project Alpha. These areas include soil exposure environments situated on the banks of watercourses or springs, all of which fall within Permanent Preservation Areas (APPs). Designated as Environmental Liabilities, these points are the focus of specific restoration projects, implemented through a Degraded Area Recovery Plan (PRADA). **Figures 7-14 and 7-15** illustrate the locations of the PRADA target areas, with the environmental recovery carried out by the company 'Arater, Consultoria e Projetos,' which is responsible for the restoration of these areas.

Figure 7-14- Points of Environmental Liabilities in APPs - Degraded or Altered areas



Source: Arater (2023).

Figure 7-15- Points of Environmental Liability in APPs – Degraded or Altered Areas



Source: Arater (2023).

According to PRADA (ARATER, 2023), the environmental liabilities in APPs at Project Alpha are characterized as follows:

- Total Permanent Preservation Area to be Recovered: 13.81 hectares.
- Location of the Permanent Preservation Area(s) to be Recovered:
  - Watercourse's Permanent Preservation Area: 9.31 hectares. (Areas 03 and 05 to 10)
  - Spring's Permanent Preservation Area: 4.50 hectares. (Areas 01, 02, and 04)

The coordinates for the locations of these areas are provided in the table below, with the area expressed in hectares.

Table 7-1- Location of PRADA target areas

IDENTIFICAÇÃO	ÁREA TOTAL	LONGITUDE (S)	LATITUDE (W)
Área 01	1,0	19° 04' 04.8''	53° 33' 49.6''
Área 02	1,3	19° 03' 57.9''	53° 33' 38.6''
Área 03	0,1	18° 56' 59.5''	53° 38' 18.6''
Área 04	2,2	18° 57' 50.8''	53° 34' 27.2''
Área 05	0,1	18° 57' 25.2''	53° 33' 47.1''
Área 06	2,9	18° 56' 01.2''	53° 34' 20.6''
Área 07	1,2	18° 55' 53.1''	53° 33' 40.6''
Área 08	0,1	18° 55' 41.0''	53° 33' 32.5''
Área 09	0,2	18° 56' 34.1''	53° 31' 49.0''
Área 10	4,7	18° 53' 27.6''	53° 32' 20.5''
TOTAL	13,81	-	-

Source: Taken from Arater (2023).

Figures 7-16 to 7-19 illustrate the scenario found for Areas 01, 02, and 05 according to surveys carried out by PRADA in January 2023. Areas 01 and 02 are spring areas, and Area 05 corresponds to a watercourse bank.

It should be noted that these environmental liabilities were inherited from the former owner of Project Alpha, did not arise as a result of the company's work, and will be recovered within 12 years, according to the data reported by PRADA in its implementation schedule.

Figure 7-16- Area 01 - Spring Area. There is exposed, sandy soil around the spring, with no riparian vegetation to protect it. The spring is partially silted up.



Source: Arater (2023).

Figure 7-17- Area 02 - Spring Area. There is exposed sandy soil around the spring, with no riparian vegetation to protect it. It is located in the midst of pastures. There are records of sediment flowing into the water.



Source: Arater (2023).

Figure 7-18- Area 05 - Watercourse bank without riparian forest and with exposed soil. In the northeast direction.



Source: Arater (2023).

Figure 7-19- Area 05 - Watercourse bank without riparian forest and with exposed soil. In the south direction. The watercourse bank has no riparian vegetation, and sediment is carried into the watercourse during rainfall.



Source: Arater (2023).

The aforementioned PRADA outlines measures to control and environmentally restore the altered areas, practices to recover the vegetation, and the adoption of environmental monitoring for these areas. The proposed actions are categorized into engineering and vegetation restoration. These activities are based on the methodology prescribed for the environmental recovery of the Permanent Preservation Area (APP) and Legal Reserve (RL), following the guidelines of CONAMA Resolution 429/2011. This resolution delineates methodologies for the recovery of APPs and includes provisions, among other things, for the natural regeneration of native species.

This technique involves analyzing the resilience potential (self-regeneration) of the areas to be recovered, considering factors such as the maximum quantity and diversity of plant material (roots, tubers, xylopodia, etc.). In the presence of these factors, regeneration is facilitated through vegetation succession, which is the sequential way in which plants occupy the surface.

According to PRADA, this method was chosen due to the presence of environmental resilience factors at the site, the availability of propagules, a seed bank, and a significant amount of preserved native vegetation fragments in the surroundings.

In view of the above, it can be said that the PRADA proposed by the company tends to be successful, considering that the main intervention at Project Alpha will be replacement of pasture areas with forestry areas, allied to the constant practice of environmental recovery and monitoring actions for the farm.

7.1.4. Water Resources

The information in this section has been primarily reproduced and/or adapted from content available in TTG Brasil (2023), Soluflor (2022) and RBG (2022). In addition, vector data from the Brazilian Foundation for Sustainable Development - FBDS[6] and the National Water Resources Information System - SNIRH[7]/ANA. Surplus, as well as content from the IMASUL[8] website's document 'Strategic Environmental Assessment of the Verde River Sub-basin', partially available on the institution's website. Other references are cited throughout the text.

[6] Available at <http://geo.fbds.org.br/MS/CAMAPUA/HIDROGRAFIA/>, accessed in October 2023.
[7]System linked to the ANA - National Water Agency, available at <https://metadados.snirh.gov.br/geonetwork/srv/search?keyword=BHO>
[8]Available at< https://www.imasul.ms.gov.br/wp-content/uploads/2021/05/c_III-Caracterizacao-da-Bacia.pdf>, accessed in October 2023. Partially available at <https://www.imasul.ms.gov.br/avaliacao-ambiental-estrategica-sub-bacia-do-rio-verde/>

7.1.4.1. Hydrography

Project Alpha is located in the Paraná Hydrographic Region, which covers 10% of Brazil's territory and encompasses seven states: São Paulo, Paraná, Mato Grosso do Sul, Minas Gerais, Goiás, Santa Catarina, and the Federal District. This region is the most populous and economically developed in the country, resulting in the highest demand for water resources, particularly for industrial use. Additionally, it boasts the largest irrigated area and the greatest utilization of available hydraulic potential (ANA, 2019 *in* SOLUFLOR, 2022).

The Paraná River Basin comprises numerous rivers, lakes, underground aquifers, and reservoirs. This basin encompasses a wide variety of ecosystems, including tropical forests, savannas, grasslands, and pampas. The biological diversity within these ecosystems plays a crucial role in maintaining the region's biodiversity and environmental health

The management and sustainable use of the water resources in the Paraná River Basin are fundamental to ensuring its preservation and the availability of drinking water and electricity for future generations. This involves measures such as monitoring water quality, controlling pollution, conserving natural ecosystems, and implementing sustainable agricultural and livestock practices.

According to the Water and Land Institute (IAT), the water quality in the Paraná River Basin is variable and depends on various factors, including the geological and climatic conditions of the region, the presence of pollutant sources, and the amount of water abstracted from the basin for human consumption and industrial use, among others. In general, water quality in the Paraná River Basin has been affected by a series of problems, including pollution from domestic and industrial sewage, the presence of sediments and nutrients, and more. Additionally, the overexploitation of water resources and the construction of dams for electricity generation have had a negative impact on water quality in the basin. Nevertheless, efforts are underway to improve water quality in the Paraná River Basin, involving the implementation of pollution control measures, sustainable water resource management, and the promotion of more responsible agricultural and industrial practices.

As previously mentioned in this document, Project Alpha is situated in the upstream portion of the Verde River Basin. The Verde River Sub-Basin is a crucial watershed located in the municipality of Camapuã, in the state of Mato Grosso do Sul. This sub-basin plays a fundamental role in providing water to the region, influencing both public supply and agricultural and livestock activities.

The farm is situated between the parallels of 18º45' and 21º15' South Latitude and the meridians 51º50' and 53º55' West Longitude. Originating in the Serra das Araras, at an elevation of approximately 500 m, in the municipality of Camapuã near Figueirão, the river flows in a northwest to southeast (NW-SE) direction until it reaches its mouth at the Paraná River. The Verde River is affected for about 30 km, at an elevation of 260.00 m, by the backwater of the Porto Primavera Hydroelectric Power Plant (HPP) lake.

The Verde River Sub-Basin is located in the southwestern part of the municipality of Camapuã, covering a substantial area. It is a part of the Paraná River Basin and stands out as one of the primary sub-basins in the region.

The Verde River serves as the main watercourse within the sub-basin, receiving several tributaries along its course that contribute to the augmentation of its water volume.

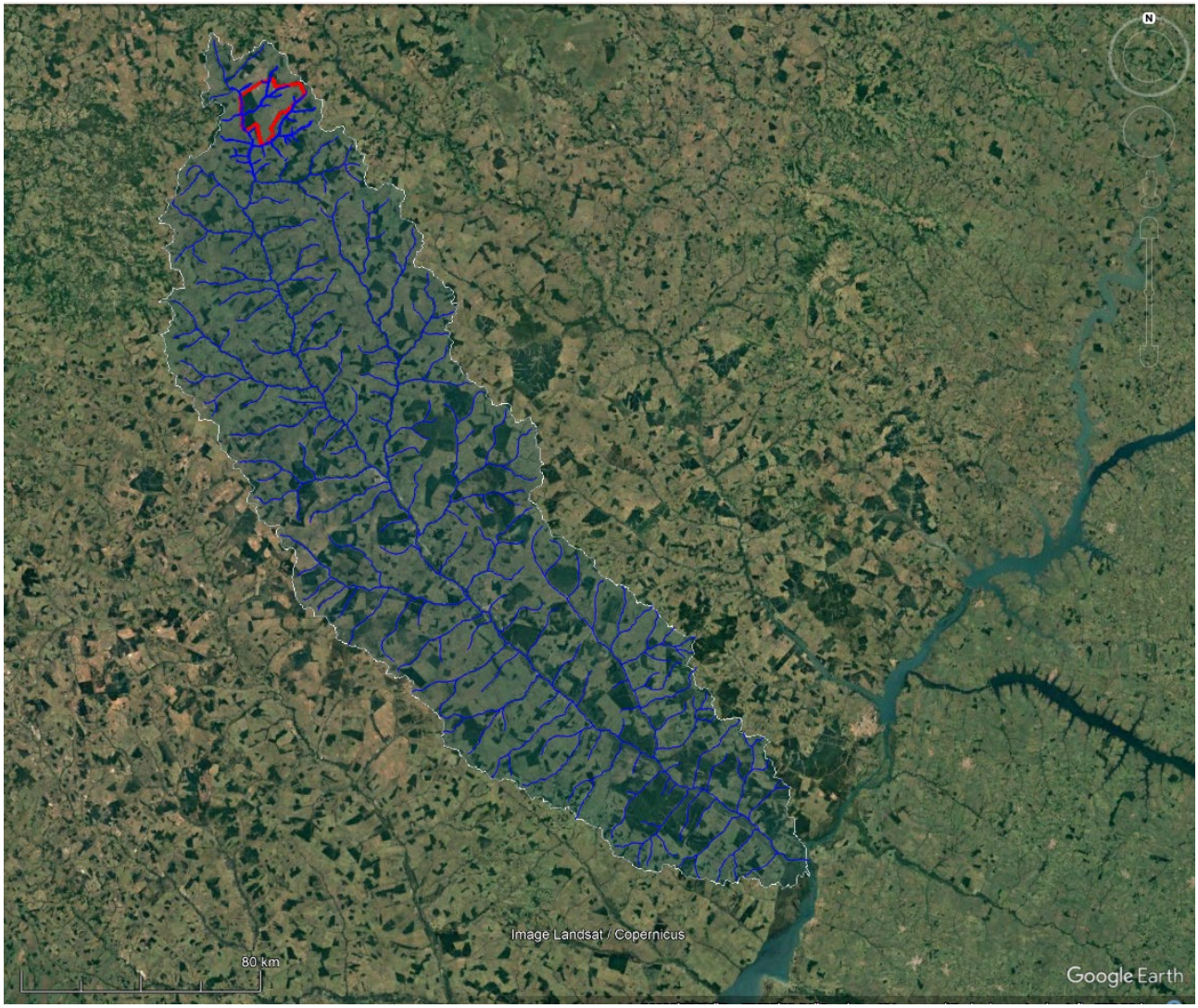
The Verde River originates near Project Alpha, situated at an altitude of approximately 980 m in the Serra das Araras, which forms the northern edge of the Paraná Sedimentary Basin, located in the municipality of Figueirão. It flows down the right bank into the Paraná River approximately 50 km downstream from the city of Três Lagoas. Initially, the Verde River runs in a NNW-SSE direction, delineating the border between the municipalities of Água Clara and Ribas do Rio Pardo. Spanning from its source to its mouth, the Verde River is approximately 451 km long.

The water of the Verde River Sub-Basin serves various purposes and plays a fundamental role in the socio-economic and environmental sustainability of the region. It is utilized for agricultural and livestock activities, contributing significantly to food production and local economic development. Additionally, the sub-basin is home to a diverse range of aquatic and terrestrial ecosystems, providing habitats for fauna and flora.

Land use in the basin is closely linked to the soil and relief conditions, influencing the feasibility of mechanization and agricultural development. Agricultural areas are primarily situated on flatter, non-hydromorphic terrain, generally distant from the Verde River's canal and its main tributaries. In steeper areas or where the physical and/or chemical characteristics of the soil are unfavorable for agricultural crops, pastures for cattle farming predominate, featuring exotic grasses such as brachiaria. Additionally, among the economically utilized areas by humans, there are homogeneous commercial plantations, mainly of eucalyptus, concentrated in the eastern part of the Verde River Sub-basin (adapted from IMASUL, 2021).

Figure 7-20 illustrates the complete hydrographic network of the Verde River Basin, ultimately flowing into the Paraná River. It shows that the Project Alpha project (depicted by the red polygon) is situated in the upstream portion of the basin, near the headwaters of the river's originating drainages. The drainage pattern of the Verde River Basin, outlined by the blue shading, is typically dendritic. The main river, the Verde River, follows an approximately linear path, with tributary contributions directed toward the inflection of the relief in a southeast (SE) direction, ultimately joining the Paraná River.

Figure 7-20- Complete hydrographic *network of* the Verde River Basin



Source: SNIRH/ANA website. Accessed October 2023. Image from *Google Earth.*

The drainage pattern visualized indicates a relief absent of physiographic anomalies that require some emphasis. It predominantly reflects drainage over soils, considering that the presence of rock formations with low alterability could potentially influence the course of the main river. The hydrography aligns with the geomorphology of gently undulating terrain, complemented by the pedology of quartzarenic orthic neosol and the lithostratigraphy of sedimentary rocks, specifically sandstones in this case.

Specific to Project Alpha, the Engano Stream originates slightly to the northeast of the farm, within a distance of less than 5 kilometers. It traverses the property in a NE-SW direction (roughly draining from northeast to southwest) before joining the Verde River. This confluence occurs at a point where the Verde River corresponds to the boundary of Project Alpha's property.

It is worth mentioning that the Verde River Basin in Mato Grosso do Sul does not have its own river basin committee. (There is a state committee in Minas Gerais for the Verde River Basin, a river with the same name, another watercourse that crosses the states of Minas Gerais and Bahia.) Furthermore, no territorial planning has been defined for the consumptive uses of water in the basin. On the other hand, the watershed of the Verde River is already predominantly occupied by agricultural farms and forestry crops, except for Legal Reserves. This characteristic contributes to Project Alpha not generating impacts that are not already present in the watershed and associated ecosystem services.

Even though there is no river basin committee specifically focused on the Verde River Basin, it is included in the 'Mato Grosso do Sul State Water Resources Plan' (IMASUL, 2010). According to the study, the main criterion used to determine water security, stress, or scarcity in river basins is the relationship between the average flow of rivers in a basin (calculated from average monthly flows, Q7.10 and Q95% drought flows, and total withdrawal flows) and the population size, a methodology proposed by the UN for a 'Sustainable Development Scenario.'

According to IMASUL (2010), the Verde River Basin falls under the 'UPG Verde' (one of the 15 Planning and Management Units established by the Mato Grosso do Sul State Water Resources Plan). As per the state document, the Verde River Basin is categorized under the 'Water Secure' status. The figure below illustrates the balance between demand and availability using this criterion (Q_{med}/Population, in m^3/inhab/year). It is evident that the entire state of Mato Grosso do Sul is classified as water secure. Therefore, it is clear that the entire Verde River Basin is not in a state of water stress or scarcity.

Figure 7-21- Water demand and water availability in Mato Grosso do Sul, according to the Average Flow/Population criteria



Source: IMASUL (2010).

7.1.4.2. Water Quality

This section presents the water quality data collected during the monitoring campaign conducted by Soluflor Soluções Florestais in December 2022 at Project Alpha.

The watercourse selected for this study is the one with the greatest representativeness in terms of length (from its entry point on the rural property to its point of exit), the widest territorial coverage concerning its recharge area, and the largest volume of water among the watercourses within the rural property. This watercourse is called Engano Stream. Four sequential sampling points were distributed along the course, following the upstream to downstream direction, with each point reflecting predetermined characteristics representing the landscape and land use, as described below.

Point 01: Designated as 'ENG01,' it was located closest to the point where the water enters the rural property.

Point 02: Designated as 'ENG02,' it was situated within the rural property in an area primarily used for productive purposes such as silviculture, pasture, or agriculture.

Point 03: Designated as 'ENG03,' it was positioned within the rural property, mainly in an area where remnants of native vegetation occur beyond the boundaries of the riparian preservation area (APP).

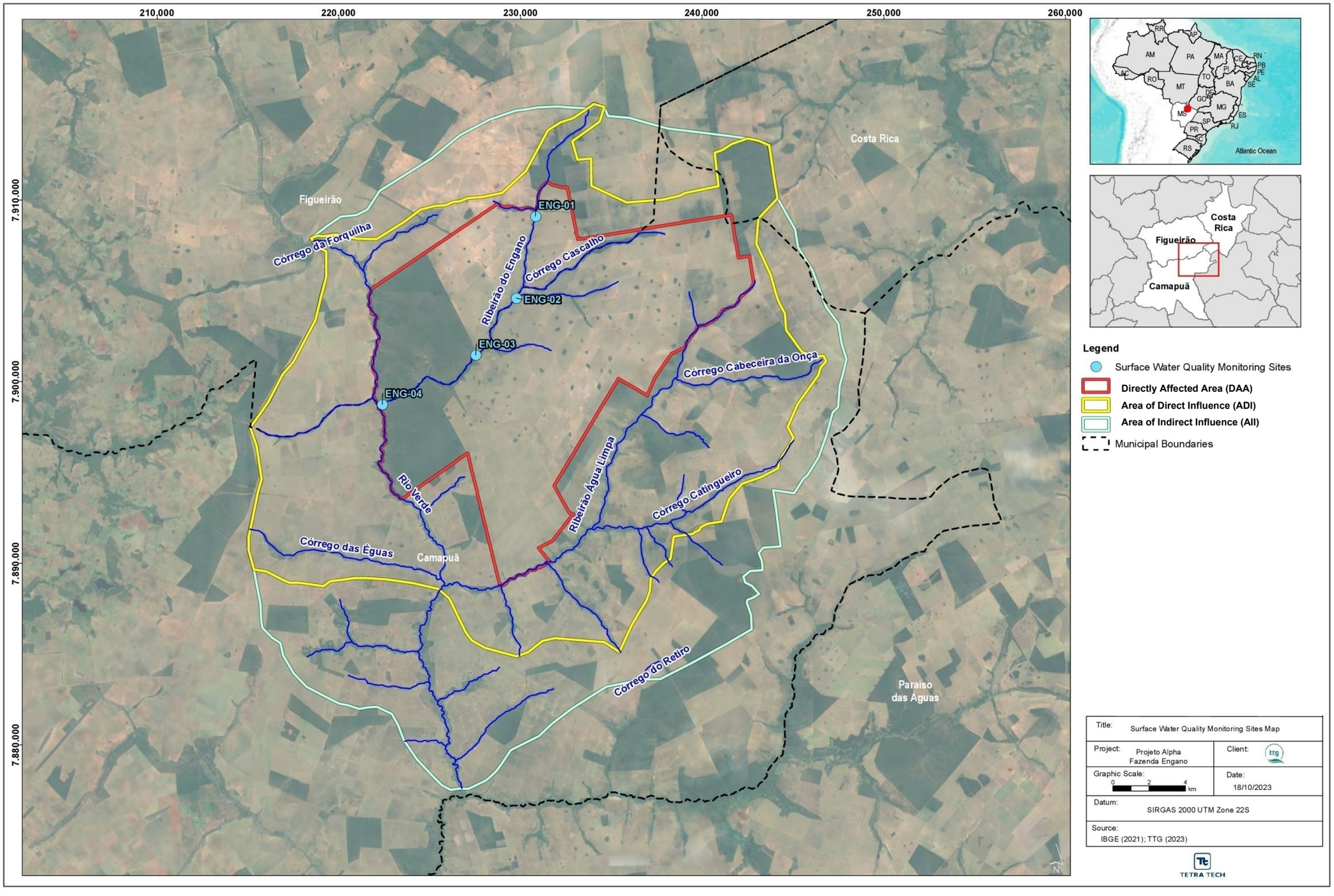
Point 04: Designated as 'ENG04,' it was located where the water exits the rural property. The geographic coordinates of the water sampling points, where the data was collected, are organized as follows.

Figure 7-22 illustrates the map with the monitoring points on the Engano Stream.

Table 7-2 – Location of Surface Water Flow and Quality Monitoring Sites.

Points	UTM Coordinates	
ENG-01	230.814	7.909.106
ENG-02	229.755	7.904.598
ENG-03	227.526	7.901.455
ENG-04	222.380	7.898.749

Figure 7-22 – Monitoring Sites for Water Quality at Project Alpha.



The sampling at the respective points followed the protocol established by Brazil's National Water and Sanitation Agency (ANA), with all necessary precautions taken during the collection, storage, and transportation.

A total of 17 parameters were collected and assessed, as listed below.

Table 7-3 – Parameters Monitored in Surface Water Samples.

Parameter	Abbreviation	Unit	Analysis type	Samples	Equipment
Thermotolerant Coliforms	CT	UFC/100mL	Laboratory	4	----
Electrical Conductivity	EC	S/m	Field	4	Conductivity meter
Biochemical Oxygen Demand	DBO5,20	mg/L	Laboratory	4	----
Foams			Field	4	Visual
Total Phosphorus	P	mg/L	Laboratory	4	----
Oil and Grease Stains			Field	4	Visual
Supernatant Material			Field	4	Visual
Total Nitrogen	N	mg/L	Laboratory	4	----
Dissolved Oxygen	OD	%	Field	4	Oximeter
Potential of Hydrogen	pH		Field	4	pH meter
Total Solid Waste	RST	mg/L	Laboratory	4	----
Water Temperature	Tágua	ºC	Field	4	pH meter
Ambient Temperature	Tambi	ºC	Field	4	Hygrometer
Total Dissolved Solids	TDS	mg/L	Field	4	Conductivity meter
Turbidity	Turb	NTU	Laboratory	4	Turbidimeter
Relative Humidity	UR	%	Field	4	Hygrometer
Flow		m^3/s	Field	4	*Flow meter (hydrometric windlass)*

Source: Adapted from Soluflor (2022).

The measurement of field parameters, such as water pH (potential of hydrogen), air temperature (°C), water temperature (°C), dissolved oxygen (DO), electrical conductivity (EC), and relative humidity of the environment (%), was conducted in the field using appropriate equipment. This equipment had been previously calibrated in accordance with the standards set by each manufacturer and equipment model.

According to Soluflor (2022), the highest ambient temperature was recorded at point ENG03, corresponding to low-lying vegetation where the measuring instrument was exposed to direct sunlight. The average ambient temperature was 31.38°C. As for water temperature, a consistently close-to-average value of 26.5°C was observed along the river's course.

In terms of potential of hydrogen (pH), at the entry point of the property (ENG01), the lowest value (5.53), indicating greater acidity, was obtained, while the exit point had the highest value (6.44), indicating lower acidity, with an average of 6.04. According to CETESB (Environmental Company of the State of São Paulo), natural waters have varying pH levels that depend on soil characteristics, temperature, and precipitation. Pivele (2019 *in* Soluflor, 2022) describes that an increase in pH value initially serves as an indicator of environmental balance. The criteria for protecting aquatic life set the pH range between 6 and 9. This parameter value was achieved from the third upstream sampling point and remained consistent downstream to the Engano Stream's mouth.

The electrical conductivity measured at the property's entry point (ENG01) was 2.00 μS/cm, which was lower compared to other points along the river's course. The values at those points remained steady at 6.00 μS/cm, resulting in an average of 5.00 μS/cm. However, this difference is not significant, given that the acceptable range for this parameter is between 1 and 2,000 μS/cm, with an accuracy of 2% (confidence interval). This parameter is related to the concentration of dissolved solids (associated with water color); the lower the amount of dissolved solids, the lower the electrical conductivity.

As for the turbidity parameter, which is associated with suspended solids levels, there was a slight increase from the stream's entry into the farm to its mouth at Verde River. The measured dissolved oxygen at the four sampling points had an average of 84.30%, showing no clear trend of increasing or decreasing values, with little variation between the points. Laboratory-measured values are presented in the table below, showing the results for each point.

Table7-4 – Results of the Monitored Parameters

Sample	Water Quality Parameter	Results Obtained	Unit
ENG01	Total Coliforms	279	UFC/100mL
	Potential of Hydrogen - pH	5,53	UpH
	Biochemical Oxygen Demand	3	$mg.L^{-1}$
	Total Nitrogen	0,05	$mg.L^{-1}$
	Total Phosphorus	12	$mg.L^{-1}$
	Water temperature	26,60	°C
	Turbidity	1,96	NTU
	Total Waste	1,00	$mg.L^{-1}$
	Dissolved Oxygen	79,90	$mgO.L^{-1}$
ENG02	Total Coliforms	241	UFC/100mL
	Potential of Hydrogen - pH	5,95	UpH
	Biochemical Oxygen Demand	1,00	$mg.L^{-1}$
	Total Nitrogen	0,05	$mg.L^{-1}$
	Total Phosphorus	12	$mg.L^{-1}$

Sample	Water Quality Parameter	Results Obtained	Unit
	Water temperature	26,40	°C
	Turbidity	3,62	NTU
	Total Waste	3,00	$mg.L^{-1}$
	Dissolved Oxygen	89,00	$mgO.L^{-1}$
ENG03	Total Coliforms	204	UFC/100mL
	Potential of Hydrogen - pH	6,22	UpH
	Biochemical Oxygen Demand	1,80	$mg.L^{-1}$
	Total Nitrogen	0,05	$mg.L^{-1}$
	Total Phosphorus	22	$mg.L^{-1}$
	Water temperature	28,40	°C
	Turbidity	3,61	NTU
	Total Waste	3,00	$mg.L^{-1}$
	Dissolved Oxygen	86,40	$mgO.L^{-1}$
ENG04	Total Coliforms	178	UFC/100mL
	Potential of Hydrogen - pH	6,44	UpH
	Biochemical Oxygen Demand	1,00	$mg.L^{-1}$
	Total Nitrogen	0,05	$mg.L^{-1}$
	Total Phosphorus	12	$mg.L^{-1}$
	Water temperature	26,60	°C
	Turbidity	3,98	NTU
	Total Waste	3,00	$mg.L^{-1}$
	Dissolved Oxygen	81,90	$mgO.L^{-1}$

Source: Adapted from Soluflor (2022).

The management and planning of strategies for the conservation and preservation of environmental resources necessitate the indispensable use of water quality monitoring results to envision the environmental sustainability of any undertaking. It is important to note that Performance Standard 04 of the International Finance Corporation (IFC) emphasizes that the preservation of ecosystem services is an inseparable part of the Health and Community Safety theme, exemplifying the maintenance of freshwater quality in mitigating impacts on the ecosystem and, consequently, on communities.

Regarding the results obtained from the monitoring campaign, both in situ analysis and laboratory analysis (pH, turbidity, dissolved oxygen, electrical conductivity, water and ambient temperature, total solids, total nitrogen, total phosphorus, BOD, and thermotolerant coliforms), the water samples from the respective points within Project Alpha comply with the standards established in CONAMA Resolution No. 357/2005. They fall within Classes 2 and 3 for freshwater, considering the parameters listed here.

➢ **Water Quality Index**

The Water Quality Index (WQI) is an important international indicator used for assessing water quality. Created in 1970 in the United States by the National Sanitation Foundation, the Water Quality Index (WQI) began to be used by CETESB (Environmental Company of the State of São Paulo) in 1975. In the following decades, other Brazilian states adopted the WQI, and it is now the primary water quality index used in the country.

Developed to assess the quality of raw water for its use in public water supply after treatment, the Water Quality Index (WQI) utilizes parameters that mostly serve as indicators of contamination caused by the discharge of domestic sewage.

It is worth noting that the evaluation of water quality obtained through the WQI has limitations, as this index does not analyze various parameters crucial for public water supply, such as toxic substances (e.g., heavy metals, agrochemicals, organic compounds), pathogenic protozoa, and substances that can affect the organoleptic indicators of water.

The WQI is composed of nine parameters (q = 9), each with its respective weight scores (w = numerical weight ranging from 0 to 1), determined based on their importance in shaping the overall water quality, as outlined below. Additionally, it includes the WQIs and the ranges adopted by each state.

Table7-5 – Parameters and Weights Scores in the WQI Assessment

Parameter	Weight (w)	q
Total Coliforms	0,150	1
Potential of Hydrogen - pH	0,120	2
Biochemical Oxygen Demand	0,100	3
Total Nitrogen	0,100	4
Total Phosphorus	0,100	5
Water temperature	0,100	6
Turbidity	0,080	7
Total Waste	0,080	8
Dissolved Oxygen	0,170	9
Total	1,000	

Source: Adapted from Soluflor (2022).

Water Quality Index		WQI ranges adopted by the following states	
		AL,MG,MT,PR,RJ,RN,RS	BA,CE,ES,GO,**MS**,PB,PE,SP
Excellent		91-100	80-100
Good		71-90	52-79
Moderate		51-70	37-51
Bad		26-50	20-36
Very bad		0-25	0-19

Source: Adapted from Soluflor (2022).

The table below presents the water quality results, this time weighting the results using the analysis for the WQI.

Table7-6 – Results of the Monitored Parameters in Relation to the WQI

Sample	Parameter	Weight	Result	Unit	Interpolated Result	Index / Parameter
Engano-01	Total Coliforms	0,15	279	UFC/100mL	30,60	1,67
	Potential of Hydrogen - pH	0,12	5,53	UpH	41,10	1,56
	Biochemical Oxygen Demand	0,10	3	$mg.L^{-1}$	70,78	1,53
	Total Nitrogen	0,10	0,05	$mg.L^{-1}$	99,59	1,58
	Total Phosphorus	0,10	12	$mg.L^{-1}$	5,00	1,17
	Water temperature	0,10	26,60	°C	94,00	1,58
	Turbidity	0,08	1,96	NTU	95,08	1,44
	Total Waste	0,08	1,00	$mg.L^{-1}$	81,01	1,42
	Dissolved Oxygen	0,17	79,90	$mgO.L^{-1}$	86,10	2,13
	WQI					**51,10**
Engano-02	Total Coliforms	0,15	241	UFC/100mL	31,86	1,68
	Potential of Hydrogen - pH	0,12	5,95	UpH	58,02	1,63
	Biochemical Oxygen Demand	0,10	1,00	$mg.L^{-1}$	88,37	1,57
	Total Nitrogen	0,10	0,05	$mg.L^{-1}$	99,59	1,58
	Total Phosphorus	0,10	12	$mg.L^{-1}$	5,00	1,17
	Water temperature	0,10	26,40	°C	94,00	1,58
	Turbidity	0,08	3,62	NTU	91,00	1,43
	Total Waste	0,08	3,00	$mg.L^{-1}$	80,71	1,42
	Dissolved Oxygen	0,17	89,00	$mgO.L^{-1}$	92,32	2,16
	WQI					**55,23**
Engano-03	Total Coliforms	0,15	204	UFC/100mL	33,33	1,69
	Potential of Hydrogen - pH	0,12	6,22	UpH	70,78	1,67
	Biochemical Oxygen Demand	0,10	1,80	$mg.L^{-1}$	80,07	1,55
	Total Nitrogen	0,10	0,05	$mg.L^{-1}$	99,59	1,58
	Total Phosphorus	0,10	22	$mg.L^{-1}$	5,00	1,17
	Water temperature	0,10	28,40	°C	94,00	1,58
	Turbidity	0,08	3,61	NTU	91,02	1,43

Sample	Parameter	Weight	Result	Unit	Interpolated Result	Index / Parameter
	Total Waste	0,08	3,00	$mg.L^{-1}$	79,91	1,42
	Dissolved Oxygen	0,17	86,40	$mgO.L^{-1}$	90,48	2,15
	WQI					**56,15**
Engano-04	Total Coliforms	0,15	178	UFC/100mL	34,55	1,70
	Potential of Hydrogen - pH	0,12	6,44	UpH	78,23	1,69
	Biochemical Oxygen Demand	0,10	1,00	$mg.L^{-1}$	88,37	1,57
	Total Nitrogen	0,10	0,05	$mg.L^{-1}$	99,59	1,58
	Total Phosphorus	0,10	12	$mg.L^{-1}$	5,00	1,17
	Water temperature	0,08	3,98	NTU	90,14	1,43
	Turbidity	0,08	3,00	$mg.L^{-1}$	81,86	1,42
	Total Waste	0,17	81,90	$mgO.L^{-1}$	87,60	2,14
	WQI					**57,45**

Source: Adapted from Soluflor (2022).

The Surface Water Quality Index (WQI) has reached satisfactory levels in relation to the standards established by Brazil's National Water and Sanitation Agency (ANA). For Project Alpha, the Water Quality Index (WQI) ranged from 51.10 to 57.45, falling into the category 'Good' for the state of Mato Grosso do Sul (MS), within the range of 52.00 to 79.00. It is also worth noting that as the Engano Stream flows within the farm's property, the WQI increases (from 51.10 to 57.45). This observation suggests that the contributing streams to the Engano Stream are categorized as 'Good,' as there is a positive trend in the indicators from the entry point of the farm to the mouth of the Engano Stream. This demonstrates a contribution to the improvement of the quality of the parameters evaluated along the course of the water.

Even though the water from the source is not directly used for human consumption, it is important to monitor and control parameters that fall outside the reference range. This is because this water resource is included in the Freshwater Section of CONAMA No. 357/2005, aimed at preserving the natural balance of aquatic communities. The lack of suitability for recreational use can affect not only human beings but also the ecosystem (BRASIL, 2005, as cited in Soluflor, 2022). Additionally, compliance with Performance Standards 4 and 6 of the IFC Standards is crucial, as these directly relate to water quality and potential impacts on ecosystem services. All the results obtained during the survey are recorded in a database - a data background - so that they can be used in the future for monitoring and comparative analyses.

7.2. BIOTIC ENVIRONMENT

7.2.1. Legally Established Conservation Areas

Performance Standard 6 recognizes that the protection and conservation of biodiversity, the maintenance of ecosystem services, and the sustainable management of living natural resources are fundamental to sustainable development. Considering the principles of this Performance Standard, Project Alpha and its surroundings were analyzed for the presence of legally protected areas or areas considered relevant for conservation.

Regarding the presence of Conservation Units, there are no Conservation Units within 3 km of its boundaries (CONAMA Resolution 428/2010). The nearest Conservation Unit is the Fazenda Lagoa Private Natural Heritage Reserve (RPPN). The Fazenda Lagoa RPPN is located in the municipality of Camapuã and was created by Semagro Resolution No. 644 of June 5th, 2017. This RPPN is part of a 1,337.98-hectare property owned by Caeté Florestal S.A and covers 150 hectares. It is intended for protection/conservation, environmental education, scientific research, visitation, and recovery of degraded areas. The RPPN is approximately 18 kilometers away from Project Alpha and is the closest protected area.

Considering Biosphere Reserves, there are no reserves established in the DAA, ADI, or AII of Project Alpha. The two closest established Biosphere Reserves are more than 300 km away and are part of the Biosphere Reserve areas associated with the Pantanal biome.

Figure 7-23- Conservation Units in the area where Project Alpha is located.

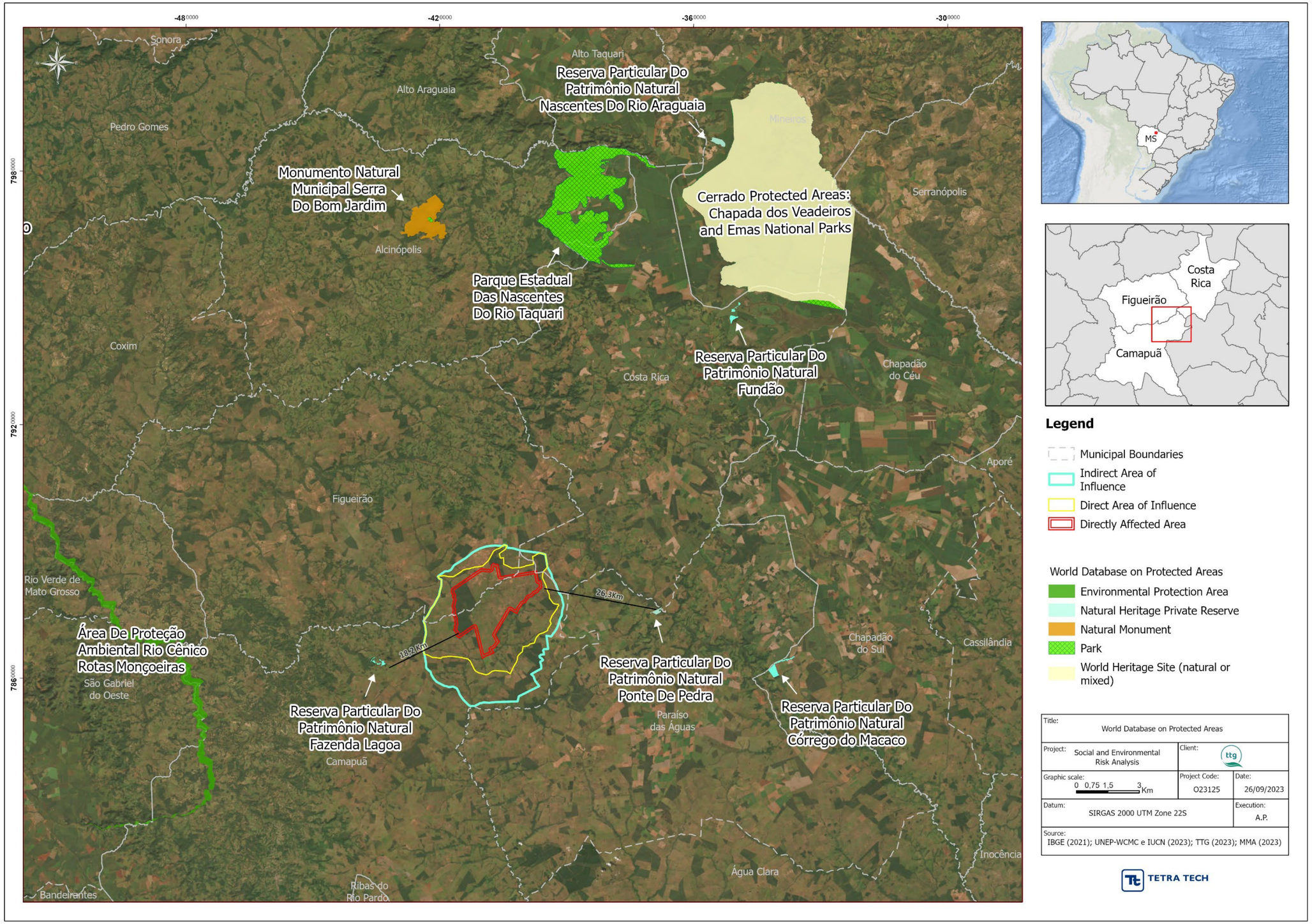
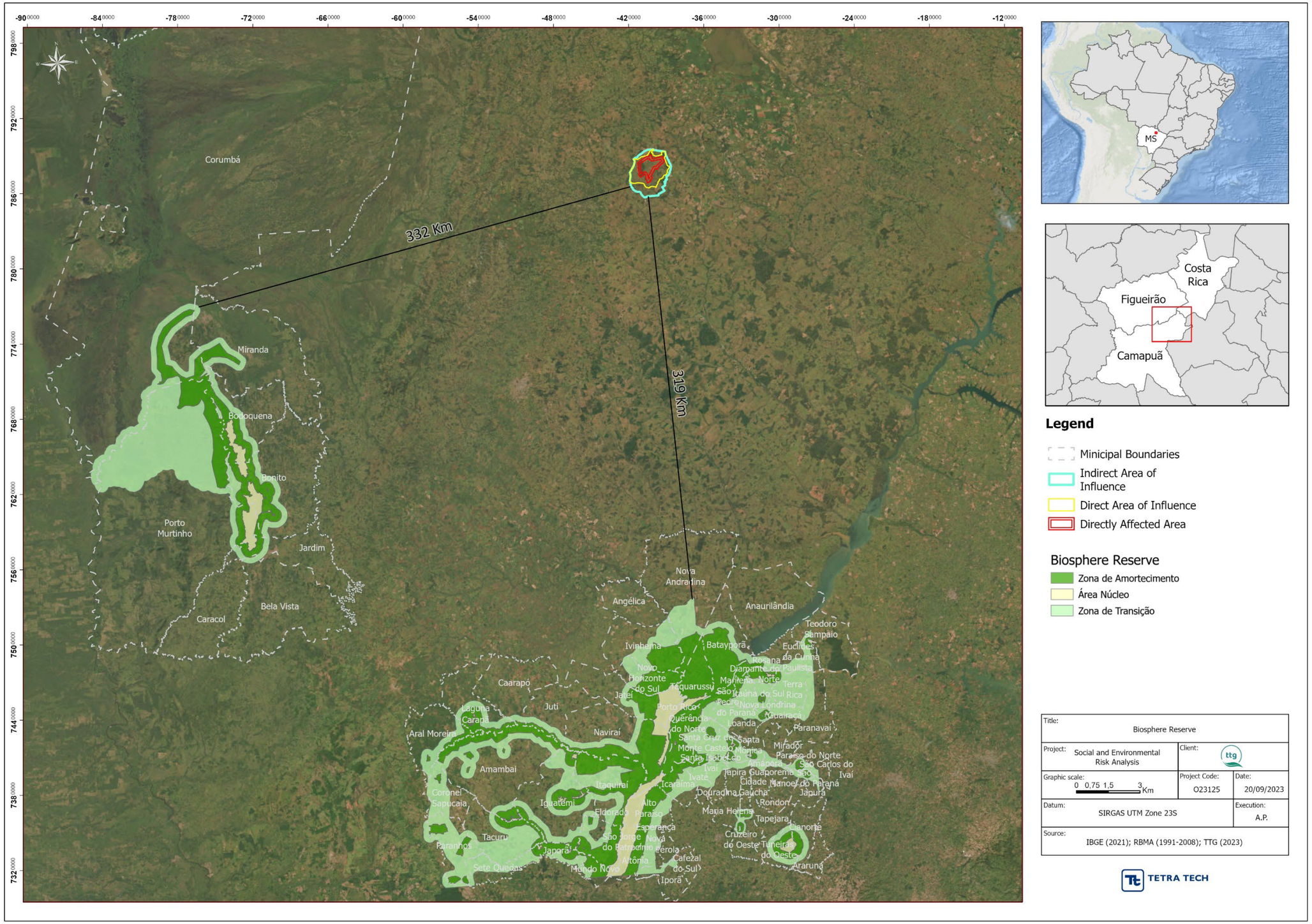


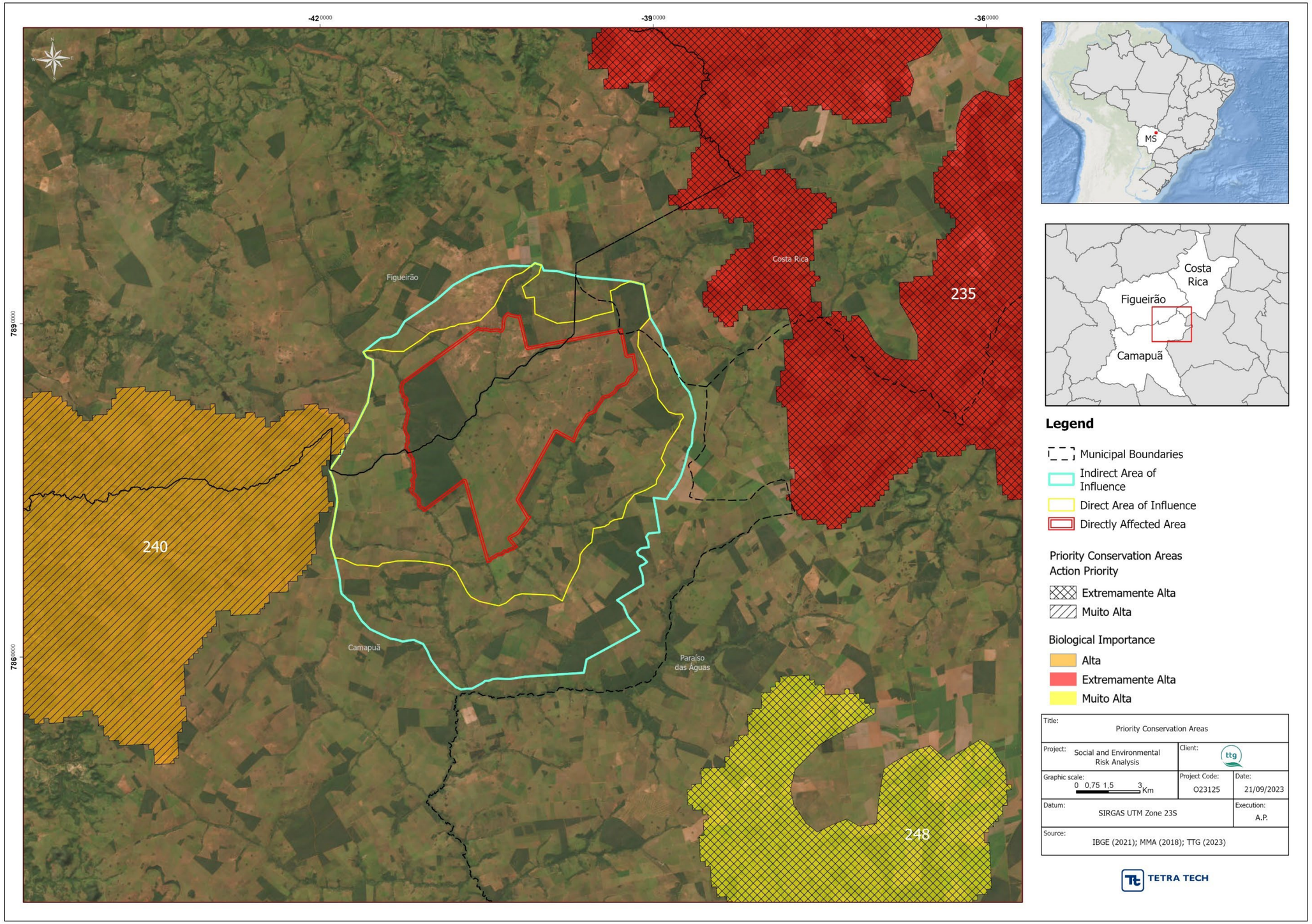
Figure 7-24- Biosphere Reserves established in the region where Project Alpha is located.



The rules for identifying such Priority Areas and Actions were formally established by Decree No. 5092 of May 21st, 2004 within the scope of the MMA's attributions. The Priority Areas and Actions for the Conservation, Sustainable Use, and Benefit Sharing of Biodiversity serve as a public policy instrument for planning and implementing appropriate measures for the conservation, recovery, and sustainable use of ecosystems. Once these areas have been determined, initiatives may include the creation of Conservation Units (UCs), requests for the licensing of potentially polluting activities, inspection, promotion of sustainable use, and environmental regularization.

Within the territory of Project Alpha, there isn’t an established Priority Area, but from the following image, it is possible to see that the surrounding area and a small portion of the AII encompass an established Priority Area with a High classification. Additionally, there are two surrounding areas of Very High and Extremely High importance, with the latter covering part of the territory of the Emas National Park.

Figure 7-25- Priority Areas for Conservation according to the MMA in the region where Project Alpha is located.



Key Biodiversity Areas (KBAs) are the most important areas in the world for conservation, considering the presence of threatened species, their ecosystems, and habitats. The Project Alpha area does not encompass any KBAs, and the nearest established areas are Emas National Park, Nhumirim, and Rio Negro and Aquidauana.

Figure 7-26- KBA Emas National Park in relation to the location of Project Alpha (in red).



Source: Adapted from https://www.keybiodiversityareas.org/sites/search.

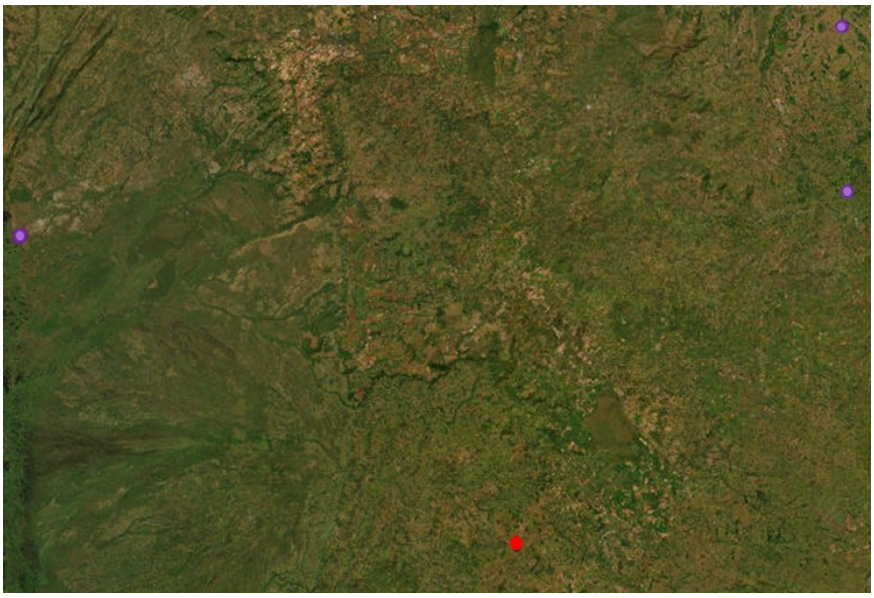
Figure 7-27- KBAs Nhumirim (north) and Rio Negro and Aquidauana (south) in relation to the location of Project Alpha (in red).



Source: Adapted from https://www.keybiodiversityareas.org/sites/search.

The Alliance for Zero Extinction (AZE) seeks to involve various stakeholders in society (government, private institutions, local, traditional and indigenous communities, NGOs, etc.) to prevent the extinction of species. AZE has already identified 853 areas with populations of species classified as 'Endangered' or 'Critically Endangered' by the IUCN. No AZE sites were recorded in the surroundings of Project Alpha, as the nearest sites are more than 200 kilometers away: Rio Paraguaizinho Cerrado, Britânia Cerrado, and Ipora Pedra Canga – all three due to the presence of threatened flora species.

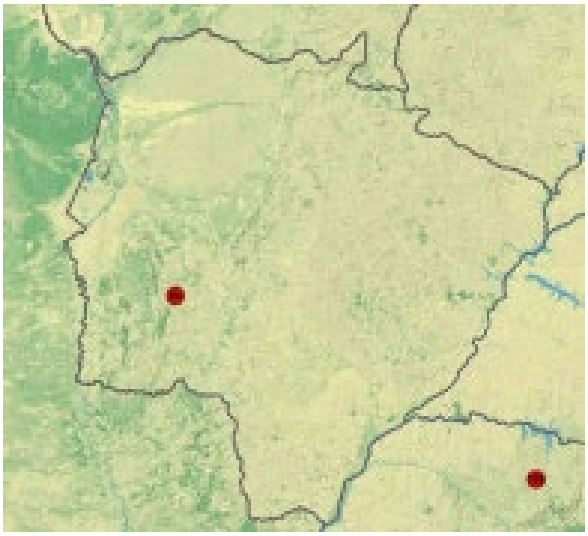
Figure 7-28- AZE sites: Rio Paraguaizinho Cerrado (in purple, on the left), Britânia Cerrado (in purple, on the upper right), and Ipora Pedra Canga (in purple, on the lower right) in relation to the location of Project Alpha (in red).



Source: Adapted from Global AZE map | Alliance for Zero Extinction

The Brazilian Alliance for Zero Extinction (BAZE) follows the same initiative as AZE. The BAZE sites serve as a tool for guiding investments, conservation strategies, and public policies aimed at territorial management and biodiversity protection. In the state of Mato Grosso do Sul, there is only one mapped site, in the southern part of the state, located outside the area of influence of Project Alpha.

Figure 7-29- BAZE sites: João de Arruda Cave is the only BAZE site in the state of Mato Grosso do Sul.



Source: Adapted from Mapa_sitios_BAZE_2018_final.pdf (mma.gov.br)

Based on the surveys carried out, it can be concluded that Project Alpha is not situated in critical or biodiversity-relevant areas. The implementation of forestry activities will not influence or impact natural forest areas. In this way, IFC Performance Standard 6 is met, especially in relation to the item on Legally Protected and Internationally Recognized Areas.

7.2.2. Flora

Project Alpha is located within the Cerrado Biome and the phytophysiognomies present correspond to the Cerrado *(lato sensu*). Project Alpha has native forest areas totaling 5,957.28 ha, most of which is made up of Legal Reserve areas, a large fragment of approximately 4,702.24 ha located in the western portion. The other portions of native vegetation are concentrated in the APPs of watercourses (482.11 ha), as well as having capons of native vegetation of different sizes (772.93 ha), which are distributed throughout the areas with pastures, eucalyptus, pine and isolated trees.

Project Alpha is located within the Cerrado Biome, and the phytophysiognomies (appearance of the plants) correspond to the Cerrado (*lato sensu*). The farm encompasses native forest areas totaling 5,957.28 ha, with the majority consisting of Legal Reserve areas. A large fragment of approximately 4,702.24 ha is located in the western portion. Other portions of native vegetation are concentrated in the APPs of watercourses (482.11 ha). Additionally, there are native vegetation woodlands (‘capões’) of different sizes (772.93 ha) distributed throughout the areas with pastures, eucalyptus, pine, and isolated trees."

Table 7-7- Current land use and occupation - Project Alpha.

Land use	Total (ha)	Inside APP (ha)	Inside LR (ha)	Outside APP and LR (ha)
Roads	**282,53**			282,53
Wet grassland	**59,02**			59,02
Water bodies	**1,09**			1,09
Buildings	**15,17**			15,17
Native Forest	**5.957,28**	482,11	4.702,24	772,93
Pasture	**14.923,41**	54,33		14.869,08
Managed pasture	**158,10**			158,10
Silviculture	**2.410,72**			2.410,72
Shrubby vegetation	**312,03**			312,03
Total	**24.119,34**	**536,44**	**4.702,24**	**18.880,65**

Currently, 9.99% of the farm is already occupied by forestry, encompassing both the older Pinus areas and the more recent Eucalyptus areas. The native vegetation areas occupy 26.24% of the farm, including wet grasslands (APP's), native forest, and shrubby vegetation (dirty field). The current occupancy map is shown below.

The farm’s occupation dates back to 1994. In the occupation study, it can be seen that by 1992, the current pasture areas were already formed, totaling 15,081.51 ha or approximately 62.53% of the total area. From 1994 and until 2020, no major changes were observed in the occupation of Project Alpha.

Figure 7-30- Current land use and occupation - Project Alpha.

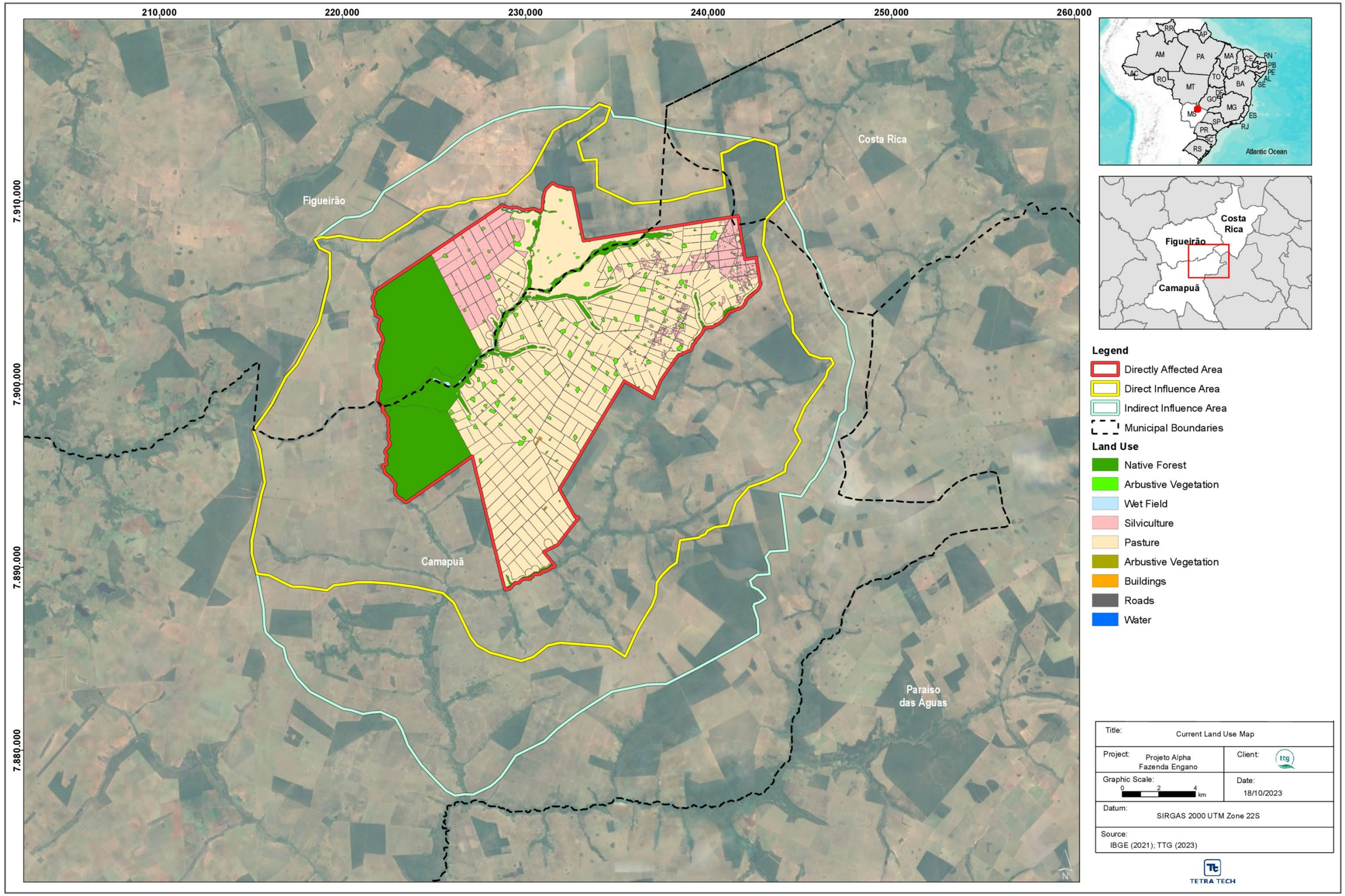
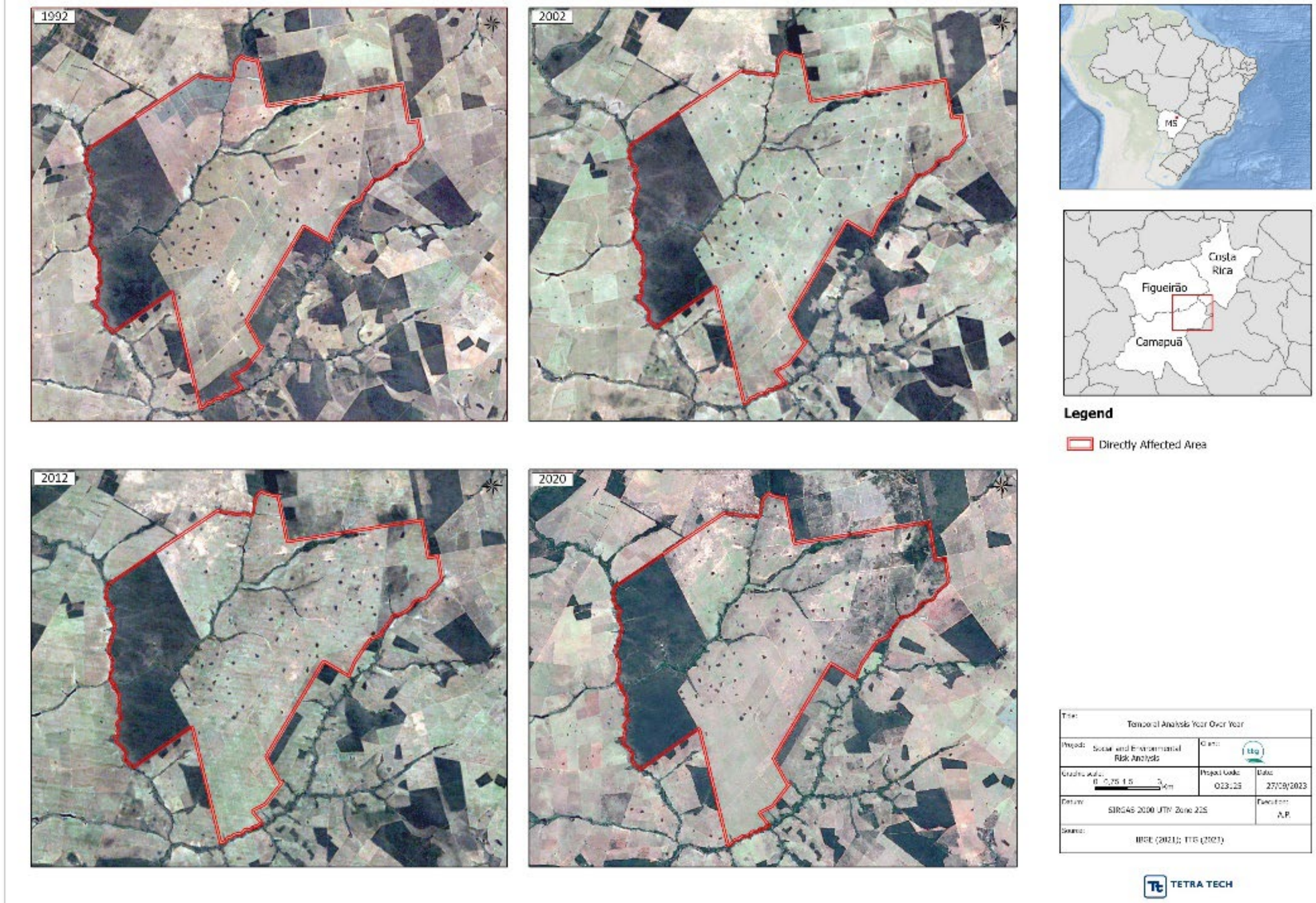


Figure 7-31- Temporal analysis map of Project Alpha.



Flora studies were conducted on the Cerrado remnants that exist at Project Alpha (SOLUFLOR, 2023). The surveys were carried out in two stages, from the end of 2022 to the beginning of 2023, during the rainy seasons. The identified species are presented below.

Table 7-8- Flora species found at Project Alpha.

Family Name	Species	Common Name	Threat status	
			BR	IUCN
Anacardiaceae	*Anacardium humile*	Cajuzinho do cerrado	-	LC
Anacardiaceae	*Astronium fraxinifolium*	Gonçalo	-	LC
Annonaceae	*Annona coriacea*	Araticum	-	LC
Annonaceae	*Annona cornifolia*	Minutes	-	-
Annonaceae	*Annona crassiflora*	Marolo	-	-
Annonaceae	*Rollinia sylvatica*	Pinha-do-campo	-	LC
Annonaceae	*Xylopia aromatica*	Pimenteira	-	LC
Annonaceae	*Xylopia emarginata*	Pindaíba	-	-
Apocynaceae	*Aspidosperma macrocarpon*	Guatambu do cerrado	-	LC
Apocynaceae	*Aspidosperma subincanum*	Guatambu	-	-
Asteraceae	*Piptocarpha rotundifolia*	Candeia	-	-
Bignoneaceae	*Tabebuia aurea*	Paratudo	-	-
Bignoneaceae	*Handroanthus ochraceus*	Ipê amarelo	-	-
Caryocaraceae	*Caryocar brasiliense*	Pequi	-	LC
Celastraceae	*Plenckia populnea*	Mangabeira brava	-	-
Chrysobalanaceae	*Hirtella ciliata*	Chorão	-	LC
Chrysobalanaceae	*Hirtella glandulosa*	Vermelhão	-	LC
Calophyllaceae	*Kielmeyera variabilis*	Pau santo	-	LC
Combretaceae	*Terminalia corrugata*	Tarumarana	-	-
Combretaceae	*Terminalia argentea*	Capitão	-	LC
Connaraceae	*Connarus suberosus*	Mata-cachorro	-	-
Dilleniaceae	*Curatella americana*	Lixeira	-	-
Fabaceae	*Anadenanthera peregrina* var. *falcata*	Angico	-	-
Fabaceae	*Andira anthelmia*	Pau oleo	-	-
Fabaceae	*Bauhinia forficata*	Pata-de-vaca	-	-
Fabaceae	*Bowdichia virgilioides*	Jatoba	-	-
Fabaceae	*Copaifera langsdorffii*	Carvoeiro	-	-
Fabaceae	*Dalbergia miscolobium*	Angico do cerrado	-	-
Fabaceae	*Dipteryx alata*	Baru	-	-
Fabaceae	*Diptychandra aurantiaca*	Inga	-	-
Fabaceae	*Enterolobium contortisiliquum*	Barbatimão	-	LC
Fabaceae	*Hymenaea stigonocarpa*	Jatobá mirim	-	LC
Fabaceae	*Inga edulis*	Ingá-vermelho	-	-
Fabaceae	*Leptolobium elegans*	Perobinha do campo	-	NT
Fabaceae	*Machaerium acutifolium*	Caviuna	-	LC
Fabaceae	*Ormosia arborea*	Baru	-	LC
Fabaceae	*Pterodon emarginatus*	Jacaranda	-	-

Family Name	Species	Common Name	Threat status	
			BR	IUCN
Fabaceae	*Salacia elliptica*	Siputa	-	LC
Fabaceae	*Stryphnodendron adstringens*	Barbatimão	-	-
Fabaceae	*Tachigali vulgaris*	Taxi-branco	-	-
Fabaceae	*Vatairea macrocarpa*	Angelim	-	-
Metteniusaceae	*Emmotum nitens*	Aderno	-	-
Lecythidaceae	*Lecythis chartacea*	Jarana-mirim	-	-
Lythraceae	*Lafoensia pacari*	Lafoensia Tree	-	LC
Malpighiaceae	*Byrsonima basiloba*	Murici	-	-
Malvaceae	*Apeiba tibourbou*	Monkey's comb	-	-
Malvaceae	*Eriotheca gracilipes*	Embiruçu	-	-
Malvaceae	*Luehea paniculata*	Açoita-cavalo	-	-
Melastomataceae	*Miconia albicans*	Canela de velho	-	-
Melastomataceae	*Miconia cuspidata*	Miconia	-	-
Melastomataceae	*Mouriri elliptica*	Coroa de frade	-	LC
Myristicaceae	*Virola sebifera*	Red ucuuba	-	-
Moraceae	*Ficus guaranitica*	Shortlleaf fig	-	-
Myrtaceae	*Myrcia neorostrata*	Small leaf guamirim	-	-
Proteaceae	*Roupala montana*	Cajueiro bravo da serra	-	-
Rubiaceae	*Alibertia edulis*	Wild gava	-	-
Salicaceae	*Casearia sylvestris*	Wild sage	-	-
Sapindaceae	*Magonia pubescens*	Timbó do cerrado/Tingui	-	LC
Sapotaceae	*Tart pouteria*	Abiu	-	LC
Siparunaceae	*Siparuna guianesis*	Negamine	-	-
Solanaceae	*Solanum lycocarpum*	Lobeira	-	-
Vochysiaceae	*Qualea grandiflora*	Pau terra	-	-
Vochysiaceae	*Qualea parviflora*	Pau terra mirim	-	-
Vochysiaceae	*Salvertia convallariodora*	Liana	-	LC

Abbreviations: LC = Least Concern; NT = Near Threatened.

Sixty-four species were identified in the survey, with the Fabaceae family having the most individuals in the areas of Project Alpha. Among these species, *Bowdichia virgilioides* (Sucupira preta) has been categorized as Near Threatened (NT) by CNCFlora, while 20 other species are categorized as Least Concern (LC). According to the IUCN, only *Bowdichia virgilioides* (Sucupira preta) is classified as Least Concern (LC). Species categorized as NE (Not Evaluated) have no vulnerability assessment. The survey did not assess whether any species are endemic to the region or to the state of Mato Grosso do Sul.

The project to occupy Project Alpha plans to create restoration areas with native vegetation. These areas are located along the APPs and in the eastern portion of the farm. While the areas for restoration along the APPs are delimited, the area to the east was not visited. One aspect that remains unclear regarding the restoration is the method that will be employed, whether it involves planting seedlings or utilizing another approach.

It is important to mention that in these restoration areas, the presence of *Brachiaria* (a genus of plant in the grass family) will require both dispersal control and removal.

To maintain areas of native vegetation, it is recommended to establish a number of projects:

- Develop studies and monitor native and restoration areas.
- Implement and conduct studies of ecological corridors with the aim of maintaining and strengthening the connectivity of native vegetation areas with other green areas around the farm, allowing gene flow.
- Periodically monitor the occurrence of exotic species in native areas and set gradual eradication targets.
- Establish partnerships with native seedling nurseries and non-governmental organizations to recover native areas using the flora information collected by the surveys.
- Maintain the surveillance and monitoring system for the risk of fires in areas of native vegetation.
- Build firebreaks around the borders of the farm's native areas to prevent fire from entering from neighboring properties.
- Establish, maintain, and populate a local database with information on all research activities, studies, and monitoring actions.

7.2.3. Fauna

The fauna of Project Alpha was recently assessed by eeCoo Sustentabilidade (2022) at the request of the company. Data from these studies were used for this diagnosis, as they are recent and were also collected within the boundaries of Project Alpha.

The species were assessed for their threat status based on official national and international lists (MMA Ordinance Nº 148/2022; IUCN, 2023). It's important to note that the state of Mato Grosso do Sul does not have an official list of endangered species. Additionally, the species were assessed for their inclusion on the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) list, endemism, and potential economic interests. This analysis considered factors such as hunting for human consumption, potential human-wildlife conflicts, *xerimbabo* (wild animal raised as a pet), or game animals.

In particular, the presence of endangered and endemic species should be analyzed in light of Performance Standard 6, which emphasizes the protection of natural habitats and the restoration of degraded areas whenever feasible.

7.2.3.1. Herpetofauna (Amphibians and Reptiles)

To assess the herpetofauna, eeCoo Sustentabilidade (2022) conducted transects in the various phytophysiognomies present at Project Alpha using active day and night searches. The studies by eeCoo Sustainability (2022) recorded a total of 34 species: 25 amphibians and nine reptiles. None of the species are considered endangered at the national level (MMA Ordinance No. 148/2022). At the international level (IUCN, 2023), one species is considered Data Deficient, and 30 species are classified as Least Concern. None of the species are included in the CITES lists, and none are endemic.

Finally, four species are considered to be of economic interest: *Leptodactylus macrosternum* (white-lipped frog) is used for human consumption for its meat, and *Paleosuchus palpebrosus* (dwarf caiman) is occasionally hunted. *Micrurus frontalis* and *Bothrops pauloensis* are venomous snakes and, therefore, are likely to cause accidents in humans.

Table 7-9- Herpetofauna species found at Project Alpha.

Order	Family	Species	MMA Status	IUCN Status	CITES	Endemism	Economic interest
Anura	Bufonidae	*Rhinella diptycha*	-	DD	-	-	-
Anura	Bufonidae	*Rhinella bergi*	-	LC	-	-	-
Anura	Hylidae	*Boana albopunctata*	-	LC	-	-	-
Anura	Hylidae	*Boana punctata*	-	LC	-	-	-
Anura	Hylidae	*Boana raniceps*	-	LC	-	-	-
Anura	Hylidae	*Dendropsophus elianeae*	-	LC	-	-	-
Anura	Hylidae	*Dendropsophus minutus*	-	LC	-	-	-
Anura	Hylidae	*Dendropsophus nanus*	-	LC	-	-	-
Anura	Hylidae	*Dendropsophus sanborni*	-	LC	-	-	-
Anura	Hylidae	*Scinax fuscomarginatus*	-	LC	-	-	-
Anura	Hylidae	*Scinax fuscovarius*	-	LC	-	-	-
Anura	Hylidae	*Scinax nasicus*	-	LC	-	-	-
Anura	Leptodactylidae	*Adenomera* sp.	-	-	-	-	-
Anura	Leptodactylidae	*Leptodactylus furnarius*	-	LC	-	-	-
Anura	Leptodactylidae	*Leptodactylus fuscus*	-	LC	-	-	-
Anura	Leptodactylidae	*Leptodactylus labyrinthicus*	-	LC	-	-	-
Anura	Leptodactylidae	*Leptodactylus macrosternum*	-	LC	-	-	yes
Anura	Leptodactylidae	*Leptodactylus podicipinus*	-	LC	-	-	-
Anura	Leptodactylidae	*Physalaemus centralis*	-	LC	-	-	-
Anura	Leptodactylidae	*Physalaemus cuvieri*	-	LC	-	-	-
Anura	Leptodactylidae	*Physalaemus nattereri*	-	LC	-	-	-
Anura	Leptodactylidae	*Pseudopaludicola falcipes*	-	LC	-	-	-
Anura	Leptodactylidae	*Pseudopaludicola mystacalis*	-	LC	-	-	-
Anura	Microhylidae	*Dermatonotus muelleri*	-	LC	-	-	-
Anura	Microhylidae	*Elachistocleis bicolor*	-	LC	-	-	-
Crocodylia	Alligatoridae	*Paleosuchus palpebrosus*	-	LC	-	-	yes
Squamata	Colubridae	*Mussurana bicolor*	-	LC	-	-	-
Squamata	Elapidae	*Micrurus frontalis*	-	LC	-	-	yes

Order	Family	Species	MMA Status	IUCN Status	CITES	Endemism	Economic interest
Squamata	Teiidae	*Ameiva ameiva*	-	LC	-	-	-
Squamata	Teiidae	*Ameivula ocellifera*	-	LC	-	-	-
Squamata	Teiidae	*Kentropyx* sp.	-	-	-	-	-
Squamata	Tropiduridae	*Tropidurus lagunablanca*	-	-	-	-	-
Squamata	Tropiduridae	*Tropidurus torquatus*	-	LC	-	-	-
Squamata	Viperidae	*Bothrops pauloensis*	-	LC	-	-	yes

Source: eeCoo Sustentabilidade (2022).

Caption: National threat status by MMA Ordinance No. 148/2022. International threat status by IUCN (2023). DD= Data Deficient; LC = Least Concern.

7.2.3.2. Avifauna (Birds)

To assess the avifauna, eeCoo Sustentabilidade (2022) conducted samplings across the various phytophysiognomies present at Project Alpha using a methodology involving fixed points and transects during both day and night. The studies by eeCoo Sustainability (2022) recorded a total of 145 bird species, of which 72 were not Passeriform and 73 were Passeriform.

None of the species are considered endangered at the national level (MMA Ordinance No. 148/2022). Internationally (IUCN, 2023), two species are classified as Near Threatened: *Alipiopsitta xanthops* and *Neothraupis fasciata*. Additionally, one species is considered Vulnerable to extinction: *Crax fasciolata* (curassow). Besides the IUCN-listed species (2023), 20 species are also included in Appendix II of the CITES list. Species in Appendix II, while not necessarily currently in danger of extinction, could become so unless the trade in specimens is subject to strict regulations.

Six species are considered endemic to the Cerrado, meaning they occur exclusively in this biome, as shown in the following table.

The Birds group is one of the most targeted for hunting and *xerimbabo* (raising wild animals as pets). Nine species are considered game animals, used for human consumption, including *C. fasciolata*, which is internationally endangered. Another eight species are also frequently caught and used as *xerimbabo* species for their ornamental or vocalization value.

Table 7-10- Bird species found at Project Alpha.

Order	Family	Species	Common Name	MMA Status	IUCN Status	CITES	Endemism	Economic interest
Rheiformes	Rheidae	*Rhea americana*	emu/greater rhea	-	-	II	-	food
Tinamiformes	Tinamidae	*Crypturellus undulatus*	undulated tinamou	-	-	-	-	food
Tinamiformes	Tinamidae	*Crypturellus parvirostris*	small-billed tinamou	-	-	-	-	food
Tinamiformes	Tinamidae	*Rhynchotus rufescens*	red-winged tinamou	-	-	-	-	food
Tinamiformes	Tinamidae	*Nothura maculosa*	spotted nothura	-	-	-	-	food
Anseriformes	Anatidae	*Cairina moschata*	Muscovy duck	-	-	-	-	food
Galliformes	Cracidae	*Penelope superciliaris*	rusty-margined guan	-	-	-	-	food
Galliformes	Cracidae	*Crax fasciolata*	bare-faced curassow	-	VU	-	-	food
Columbiformes	Columbidae	*Patagioenas picazuro*	picazuro pigeon	-	-	-	-	food
Columbiformes	Columbidae	*Patagioenas cayennensis*	pale-vented pigeon	-	-	-	-	-
Columbiformes	Columbidae	*Leptotila verreauxi*	white-tipped dove	-	-	-	-	-
Columbiformes	Columbidae	*Leptotila rufaxilla*	grey-fronted dove	-	-	-	-	-
Columbiformes	Columbidae	*Zenaida auriculata*	eared dove	-	-	-	-	-
Columbiformes	Columbidae	*Columbina squammata*	scaled dove	-	-	-	-	-
Cuculiformes	Cuculidae	*Guira guira*	guira cuckoo	-	-	-	-	-
Cuculiformes	Cuculidae	*Crotophaga ani*	smooth-billed ani	-	-	-	-	-
Cuculiformes	Cuculidae	*Tapera naevia*	striped cuckoo	-	-	-	-	-
Cuculiformes	Cuculidae	*Piaya cayana*	squirrel cuckoo	-	-	-	-	-
Cuculiformes	Cuculidae	*Coccyzus melacoryphus*	dark-billed cuckoo	-	-	-	-	-
Cuculiformes	Cuculidae	*Coccyzus euleri*	pearly-breasted cuckoo	-	-	-	-	-
Nyctibiiformes	Nyctibiidae	*Nyctibius griseus*	common potoo	-	-	-	-	-
Caprimulgiformes	Caprimulgidae	*Nyctidromus albicollis*	pauraque	-	-	-	-	-
Apodiformes	Apodidae	*Chaetura meridionalis*	Sick's swift	-	-	-	-	-
Apodiformes	Trochilidae	*Thalurania furcata*	fork-tailed woodnymph	-	-	II	-	-
Apodiformes	Trochilidae	*Eupetomena macroura*	swallow-tailed hummingbird	-	-	II	-	-
Apodiformes	Trochilidae	*Chionomesa fimbriata*	glittering-throated emerald	-	-	II	-	-
Gruiformes	Rallidae	*Mustelirallus albicollis*	ash-throated crake	-	-	-	-	-

Order	Family	Species	Common Name	MMA Status	IUCN Status	CITES	Endemism	Economic interest
Charadriiformes	Charadriidae	*Vanellus chilensis*	southern lapwing	-	-	-	-	-
Charadriiformes	Jacanidae	*Jacana jacana*	wattled jacana	-	-	-	-	-
Pelecaniformes	Ardeidae	*Tigrisoma lineatum*	rufescent tiger heron	-	-	-	-	-
Pelecaniformes	Ardeidae	*Butorides striata*	striated heron	-	-	-	-	-
Pelecaniformes	Ardeidae	*Syrigma sibilatrix*	whistling heron	-	-	-	-	-
Pelecaniformes	Threskiornithidae	*Mesembrinibis cayennensis*	green ibis	-	-	-	-	-
Pelecaniformes	Threskiornithidae	*Theristicus caudatus*	buff-necked ibis	-	-	-	-	-
Cathartiformes	Cathartidae	*Coragyps atratus*	black vulture	-	-	-	-	-
Cathartiformes	Cathartidae	*Catharters aura*	turkey vulture	-	-	-	-	-
Cathartiformes	Cathartidae	*Cathartes burrovianus*	lesser yellow-headed vulture	-	-	-	-	-
Accipitriformes	Accipitridae	*Chondrohierax uncinatus*	hook-billed kite	-	-	-	-	-
Accipitriformes	Accipitridae	*Rosthramus sociabilis*	snail kite	-	-	-	-	-
Accipitriformes	Accipitridae	*Ictinea plumbea*	plumbeous kite	-	-	-	-	-
Accipitriformes	Accipitridae	*Geranospiza caerulescens*	crane hawk	-	-	-	-	-
Accipitriformes	Accipitridae	*Heterospizias meridionalis*	savanna hawk	-	-	-	-	-
Accipitriformes	Accipitridae	*Rupornis magnirostris*	roadside hawk	-	-	-	-	-
Accipitriformes	Accipitridae	*Geranoaetus albicaudatus*	white-tailed hawk	-	-	-	-	-
Strigiformes	Tytonidae	*Tyto furcata*	American barn owl	-	-	II	-	-
Strigiformes	Strigidae	*Megascops choliba*	tropical screech owl	-	-	II	-	-
Strigiformes	Strigidae	*Glaucidium brasilianum*	ferruginous pygmy owl	-	-	II	-	-
Strigiformes	Strigidae	*Athene cunicularia*	burrowing owl	-	-	II	-	-
Trogoniformes	Trogonidae	*Trogon curucui*	blue-crowned trogon	-	-	-	-	-
Coraciiforms	Momotidae	*Momotus momota*	Amazonian motmot	-	-	-	-	-
Galbuliformes	Galbulidae	*Nyctidromus albicollis*	pauraque	-	-	-	-	-
Galbuliformes	Bucconidae	*Nystalus striatipectus*	Chaco puffbird	-	-	-	-	-
Galbuliformes	Bucconidae	*Nystalus chacuru*	white-eared puffbird	-	-	-	-	-
Piciformes	Ramphastidae	*Ramphastos toco*	ioco toucan	-	-	II	-	ornamental/song bird

Order	Family	Species	Common Name	MMA Status	IUCN Status	CITES	Endemism	Economic interest
Piciformes	Picidae	*Melanerpes candidus*	white woodpecker	-	-	-	-	-
Piciformes	Picidae	*Veniliornis passerinus*	little woodpecker	-	-	-	-	-
Piciformes	Picidae	*Campephilus melanoleucos*	crimson-crested woodpecker	-	-	-	-	-
Piciformes	Picidae	*Dryocopus lineatus*	lineated woodpecker	-	-	-	-	-
Piciformes	Picidae	*Colaptes campestris*	campo flicker	-	-	-	-	-
Cariamiformes	Cariamidae	*Cariama cristata*	red-legged seriema	-	-	-	-	-
Falconiformes	Falconidae	*Herpetotheres cachinnans*	laughing falcon	-	-	II	-	-
Falconiformes	Falconidae	*Caracara plancus*	crested caracara	-	-	II	-	-
Falconiformes	Falconidae	*Milvago chimachima*	yellow-headed caracara	-	-	II	-	-
Falconiformes	Falconidae	*Falco sparverius*	sparrow hawk	-	-	II	-	-
Falconiformes	Falconidae	*Falco femoralis*	aplomado falcon	-	-	II	-	-
Psittaciformes	Psittacidae	*Brotogeris chiriri*	yellow-chevroned parakeet	-	-	II	-	-
Psittaciformes	Psittacidae	*Alipiopsitta xanthops*	yellow-faced parrot	-	NT	II	Cerrado	ornamental/song bird
Psittaciformes	Psittacidae	*Amazona amazonica*	orange-winged parrot	-	-	II	-	ornamental/song bird
Psittaciformes	Psittacidae	*Amazona aestiva*	blue-fronted parrot	-	-	II	-	ornamental/song bird
Psittaciformes	Psittacidae	*Eupsithula aurea*	peach-fronted parakeet	-	-	II	-	ornamental/song bird
Psittaciformes	Psittacidae	*Ara ararauna*	blue-and-yellow macaw	-	-	II	-	ornamental/song bird
Psittaciformes	Psittacidae	*Diopsittaca nobilis*	red-shouldered macaw	-	-	-	-	-
Passeriformes	Thamnophilidae	*Formicivora rufa*	rusty-backed antwren	-	-	-	-	-
Passeriformes	Thamnophilidae	*Herpsilochmus longirostris*	large-billed antwren	-	-	-	Cerrado	-
Passeriformes	Thamnophilidae	*Thamnophilus doliatus*	barred antshrike	-	-	-	-	-
Passeriformes	Thamnophilidae	*Thamnophilus pelzeni*	flatland shock	-	-	-	-	-
Passeriformes	Dendrocolaptidae	*Sittasomus griseicapillus*	olivaceous woodcreeper	-	-	-	-	-
Passeriformes	Dendrocolaptidae	*Dendrocolaptes platyrostris*	planalto woodcreeper	-	-	-	-	-

Order	Family	Species	Common Name	MMA Status	IUCN Status	CITES	Endemism	Economic interest
Passeriformes	Dendrocolaptidae	*Lepidocolaptes angustirostris*	narrow-billed woodcreeper	-	-	-	-	-
Passeriformes	Furnariidae	*Furnarius rufus*	rufous hornero	-	-	-	-	-
Passeriformes	Furnariidae	*Certhiaxis cinnamomeus*	yellow-chinned spinetail	-	-	-	-	-
Passeriformes	Furnariidae	*Synallaxis albescens*	pale-breasted spinetail	-	-	-	-	-
Passeriformes	Pipridae	*Neopelma pallescens*	pale-bellied tyrant-manakin	-	-	-	-	-
Passeriformes	Pipridae	*Antilophia galeata*	helmeted manakin	-	-	-	Cerrado	-
Passeriformes	Tityridae	*Tityra cayana*	black-tailed tityra	-	-	-	-	-
Passeriformes	Tityridae	*Pachyramphus polychopterus*	white-winged becard	-	-	-	-	-
Passeriformes	Rhynchocyclidae	*Tolmomyias sulphurescens*	yellow-olive flatbill	-	-	-	-	-
Passeriformes	Rhynchocyclidae	*Todirostrum cinereum*	common tody-flycatcher	-	-	-	-	-
Passeriformes	Rhynchocyclidae	*Hemitriccus margaritaceiventer*	pearly-vented tody-tyrant	-	-	-	-	-
Passeriformes	Tyrannidae	*Euscarthmus meloryphus*	fulvous-crowned scrub tyrant	-	-	-	-	-
Passeriformes	Tyrannidae	*Camptostoma obsoletum*	southern beardless tyrannulet	-	-	-	-	-
Passeriformes	Tyrannidae	*Elaenia flavogaster*	yellow-bellied elaenia	-	-	-	-	-
Passeriformes	Tyrannidae	*Elaenia chiriquensis*	lesser elaenia	-	-	-	-	-
Passeriformes	Tyrannidae	*Myiopagis viridicata*	greenish elaenia	-	-	-	-	-
Passeriformes	Tyrannidae	*Phaeomyias murina*	southern mouse-colored tyrannulet	-	-	-	-	-
Passeriformes	Tyrannidae	*Legatus leucophaius*	piratic flycatcher	-	-	-	-	-
Passeriformes	Tyrannidae	*Myiarchus swainsoni*	Swainson's flycatcher	-	-	-	-	-
Passeriformes	Tyrannidae	*Myiarchus ferox*	short-crested flycatcher	-	-	-	-	-
Passeriformes	Tyrannidae	*Myiarchus tyrannulus*	brown-crested flycatcher	-	-	-	-	-
Passeriformes	Tyrannidae	*Casiornis rufus*	rufous casiornis	-	-	-	-	-
Passeriformes	Tyrannidae	*Pitangus sulphuratus*	great kiskadee	-	-	-	-	-
Passeriformes	Tyrannidae	*Myiodynastes maculatus*	streaked flycatcher	-	-	-	-	-

Order	Family	Species	Common Name	MMA Status	IUCN Status	CITES	Endemism	Economic interest
Passeriformes	Tyrannidae	*Megarynchus pitangua*	boat-billed flycatcher	-	-	-	-	-
Passeriformes	Tyrannidae	*Myiozetetes cayanensis*	rusty-margined flycatcher	-	-	-	-	-
Passeriformes	Tyrannidae	*Tyrannus albogularis*	white-throated kingbird	-	-	-	-	-
Passeriformes	Tyrannidae	*Tyrannus melancholicus*	tropical kingbird	-	-	-	-	-
Passeriformes	Tyrannidae	*Tyrannus savana*	fork-tailed flycatcher	-	-	-	-	-
Passeriformes	Tyrannidae	*Arundinicola leucocephala*	white-headed marsh tyrant	-	-	-	-	-
Passeriformes	Tyrannidae	*Gubernetes yetapa*	gubernetes yetapa	-	-	-	-	-
Passeriformes	Tyrannidae	*Xolmis velatus*	white-rumped monjita	-	-	-	-	-
Passeriformes	Tyrannidae	*Nengetus cinereus*	grey monjita	-	-	-	-	-
Passeriformes	Vireonidae	*Cyclarhis gujanensis*	rufous-browed peppershrike	-	-	-	-	-
Passeriformes	Vireonidae	*Vireo chivi*	chivi vireo	-	-	-	-	-
Passeriformes	Corvidae	*Cyanocorax cristatellus*	curl-crested jay	-	-	-	Cerrado	-
Passeriformes	Polioptilidae	*Polioptila dumicola*	masked gnatcatcher	-	-	-	-	-
Passeriformes	Turdidae	*Turdus leucomelas*	pale-breasted thrush	-	-	-	-	-
Passeriformes	Mimidae	*Mimus saturninus*	chalk-browed mockingbird	-	-	-	-	-
Passeriformes	Fringillidae	*Euphonia chlorotica*	purple-throated Euphonia	-	-	-	-	-
Passeriformes	Passerellidae	*Ammodramus humeralis*	grassland sparrow	-	-	-	-	-
Passeriformes	Passerellidae	*Zonotrichia capensis*	rufous-collared sparrow	-	-	-	-	-
Passeriformes	Icteridae	*Superciliary leistes*	white-browed meadowlark	-	-	-	-	-
Passeriformes	Icteridae	*Molothrus rufoaxillaris*	screaming cowbird	-	-	-	-	-
Passeriformes	Icteridae	*Molothrus bonariensis*	shiny cowbird	-	-	-	-	-
Passeriformes	Icteridae	*Gnorimopsar chopi*	chopi blackbird	-	-	-	-	-
Passeriformes	Icteridae	*Pseudoleistes guirahuro*	yellow-rumped Marshbird	-	-	-	-	-
Passeriformes	Parulidae	*Myiothlypis leucophrys*	white-striped warbler	-	-	-	Cerrado	-
Passeriformes	Parulidae	*Myiothlypis flaveola*	flavescent warbler	-	-	-	-	-
Passeriformes	Parulidae	*Basileuterus culicivorus*	golden-crowned warbler	-	-	-	-	-
Passeriformes	Thraupidae	*Emberizoides herbicola*	wedge-tailed grass finch	-	-	-	-	-

Order	Family	Species	Common Name	MMA Status	IUCN Status	CITES	Endemism	Economic interest
Passeriformes	Thraupidae	*Hemithraupis guira*	guira tanager	-	-	-	-	-
Passeriformes	Thraupidae	*Cyanerpes cyaneus*	red-legged honeycreeper	-	-	-	-	-
Passeriformes	Thraupidae	*Dacnis cayana*	turquoise honeycreeper	-	-	-	-	-
Passeriformes	Thraupidae	*Saltatricula atricollis*	black-throated saltator	-	-	-	Cerrado	-
Passeriformes	Thraupidae	*Saltator similis*	green-winged saltator	-	-	-	-	ornamental/song bird
Passeriformes	Thraupidae	*Volatinia jacarina*	blue-black grassquit	-	-	-	-	-
Passeriformes	Thraupidae	*Eucometis penicillata*	grey-headed tanager	-	-	-	-	-
Passeriformes	Thraupidae	*Coryphospingus cucullatus*	red pileated finch	-	-	-	-	-
Passeriformes	Thraupidae	*Sporophila plumbea*	plumbeous seedeater	-	-	-	-	-
Passeriformes	Thraupidae	*Cypsnagra hirundinacea*	white-rumped tanager	-	-	-	-	-
Passeriformes	Thraupidae	*Sicalis flaveola*	saffron finch	-	-	-	-	ornamental/song bird
Passeriformes	Thraupidae	*Sicalis luteola*	grassland yellow finch	-	-	-	-	-
Passeriformes	Thraupidae	*Neothraupis fasciata*	white-banded tanager	-	NT	-	-	-
Passeriformes	Thraupidae	*Thraupis sayaca*	sayaca tanager	-	-	-	-	-
Passeriformes	Thraupidae	*Thraupis palmarum*	palm tanager	-	-	-	-	-
Passeriformes	Thraupidae	*Stilpnia cayana*	burnished-buff tanager	-	-	-	-	-

Source: eeCoo Sustentabilidade (2022).

Caption: National threat status by MMA Ordinance No. 148/2022. International threat status by IUCN (2023). VU = Vulnerable; NT = Near Threatened.

Specifically for the bird group, the study area was examined for the presence of species included in CEMAVE's Conservation Action Plans, the IBA *(*Important Bird Areas), and to determine if the study area is psrt of known migratory routes.

The study area falls within the region covered by the 'National Action Plan for the Conservation of Birds of the Cerrado and Pantanal'. This document aims to establish targets and actions for the conservation of a total of 52 species. Among the 52 species included in the National Action Plan, one was recorded at Project Alpha: *Alipiopsitta xanthops* (Yellow-faced Parrot).

With regard to IBA (Important Bird Areas), Project Alpha is not part of any established IBA. The nearest areas are: Emas National Park, located 76 km away, and the Rio Negro and Aquidauana area, located 232 km away.

As for established Migratory Areas, Project Alpha is not part of any known Migratory Area. The nearest areas are located to the southwest and northeast, just over 40 km away.

Figure 7-32- Important Bird Areas (IBAs) recorded in the region where Project Alpha is located.

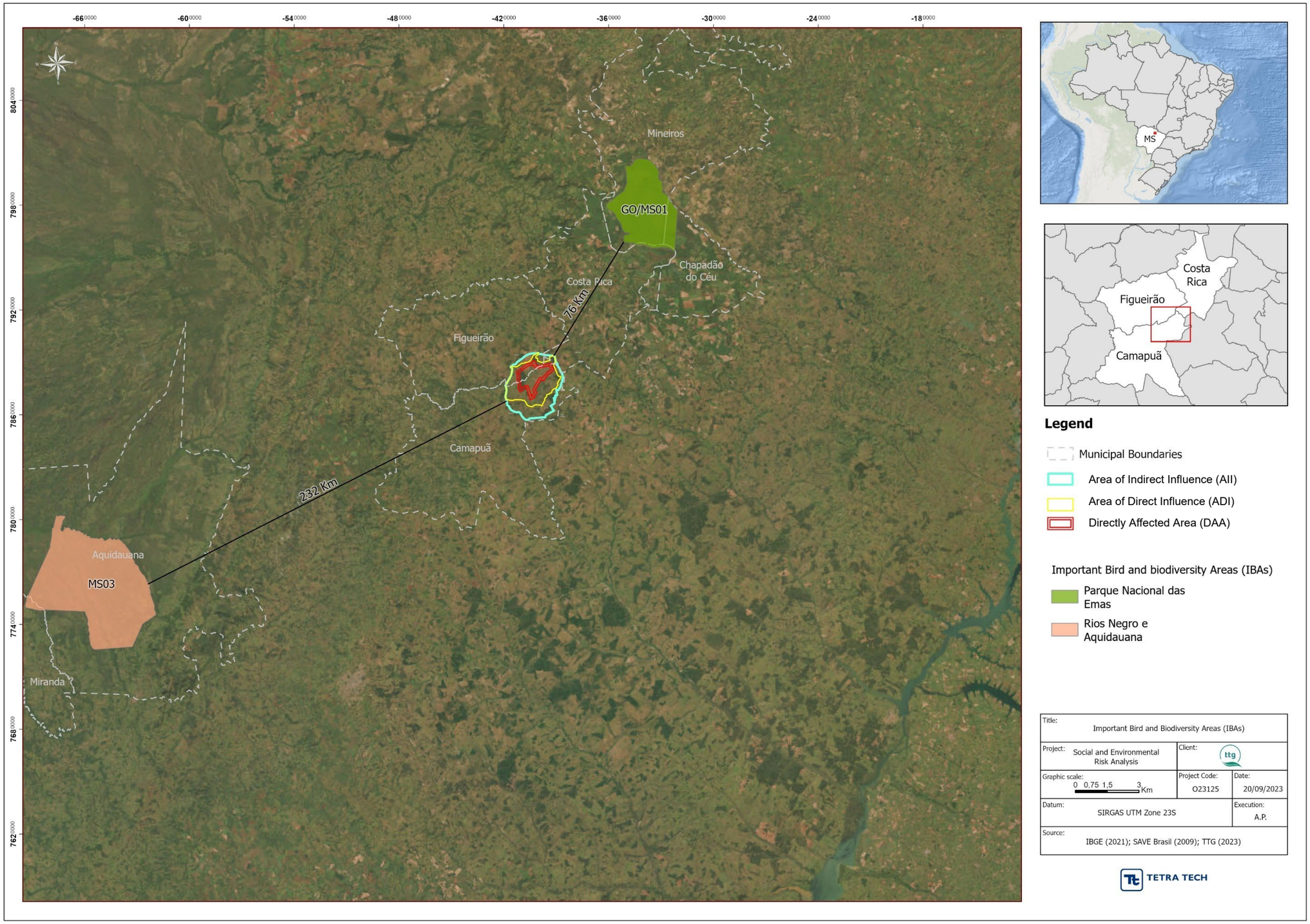
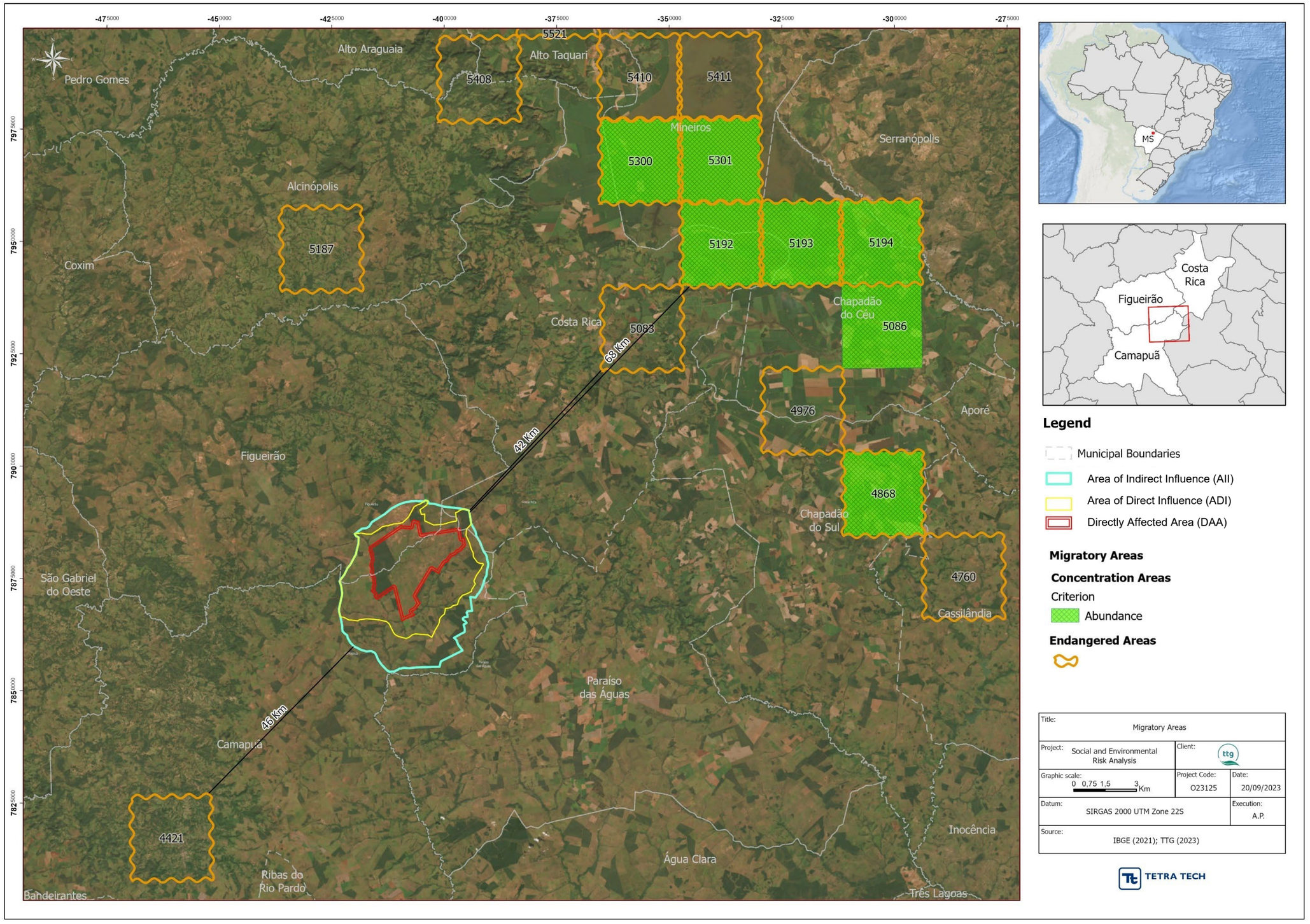


Figure 7-33- Migratory Bird Areas recorded in the region where Project Alpha is located.



7.2.3.3. Terrestrial Mastofauna (Terrestrial Mammals)

To assess the Mastofauna, eeCoo Sustentabilidade (2022) conducted samplings across the different phytophysiognomies present at Project Alpha using the transect method during day and night, occasional recordings, and camera trapping. The studies by eeCoo Sustentabilidade (2022) specifically focused on medium and large terrestrial mammals, recording a total of 21 species.

Six of these species are considered threatened with extinction at the national level (MMA Ordinance No. 148/2022), all falling into the Vulnerable category: *Priodontes maximus* (giant armadillo), *Myrmecophaga tridactyla* (giant anteater), *Sapajus cay* (hooded capuchin), *Chrysocyon brachyurus* (maned wolf), *Tapirus terrestris* (Brazilian tapir), and *Ozotoceros bezoarticus* (Pampas deer). It is noteworthy that the destruction of natural habitats is a common factor contributing to the threat level of all these species.

All registered species are included in an international level of classification (IUCN, 2023): one Data Deficient species *(Dasyprocta azarae* – cutia); 12 species of Least Concern *(Dasypus novemcinctus* - nine-banded armadillo, *Euphractus sexcinctus* – six-banded armadillo, *Cabassous unicinctus* - southern naked-tailed armadillo, *Tamandua tetradactyla* - southern tamandua, *Leopardus pardalis* – ocelot, *Puma concolor* – puma, *Cerdocyon thous* – crab-eating fox, *Conepatus semistriatus* - striped hog-nosed skunk, *Eira barbara* – tayra, *Pecari tajacu* – collared peccary, *Mazama gouazoubira* – gray brocket and *Hydrochoerus hydrochaeris* – capybara), two Near Threatened species *(Chrysocyon brachyurus* – maned wolf, *Ozotoceros bezoarticus* – Pampas deer); five Vulnerable species *(Priodontes maximus* – giant armadillo, *Myrmecophaga tridactyla* – giant anteater, *Sapajus cay* – hooded capuchin, *Tapirus terrestris* – Brazilian tapir and *Tayassu pecari* – white-lipped peccary); and one Endangered species in *(Sylvilagus brasiliensis* - common tapeti).

Regarding the CITES list, three species are included in Appendix I (considered endangered), and eight are included in Appendix II. While the latter are not necessarily endangered at present, they could become so unless the trade in specimens is subject to strict regulations.

Concerning endemism, it is important to note that the maned wolf (*Chrysocyon brachyurus*) is considered endemic to the Cerrado biome. Out of the 21 species, more than half, a total of 11 species, are hunted, either for human consumption (nine species) or due to human-wildlife conflict (two species).

Table 7-11- Terrestrial mammal species found at Project Alpha.

Order	Family	Species	Common name	MMA Status	IUCN Status	CITES	Endemism	Economic interest
Cingulata	Dasypodidae	*Dasypus novemcinctus*	nine-banded armadillo	-	LC	-	-	hunting
Cingulata	Dasypodidae	*Euphractus sexcinctus*	six-banded armadillo	-	LC	-	-	hunting
Cingulata	Dasypodidae	*Priodontes maximus*	giant armadillo	VU	VU	I	-	hunting
Cingulata	Dasypodidae	*Cabassous unicinctus*	southern naked-tailed armadillo	-	LC	-	-	hunting
Pilosa	Myrmecophagidae	*Myrmecophaga tridactyla*	giant anteater	VU	VU	II	-	-
Pilosa	Myrmecophagidae	*Tamandua tetradactyla*	southern tamandua		LC	-	-	-
Primates	Cebidae	*Sapajus cay*	hooded capuchin	VU	VU	II	-	-
Lagomorpha	Leporidae	*Sylvilagus brasiliensis*	common tapeti	-	EN	-	-	hunting
Carnivora	Felidae	*Leopardus pardalis*	ocelot	-	LC	I	-	conflict
Carnivora	Felidae	*Puma concolor*	puma	-	LC	II	-	conflict
Carnivora	Canidae	*Cerdocyon thous*	crab-eating fox	-	LC	II	-	-
Carnivora	Canidae	*Chrysocyon brachyurus*	maned wolf	VU	NT	II	Cerrado	conflict
Carnivora	Mephitidae	*Conepatus semistriatus*	striped hog-nosed skunk	-	LC	-	-	-
Carnivora	Mustelidae	*Eira barbara*	tayra	-	LC	-	-	-
Perissodactyla	Tapiridae	*Tapirus terrestris*	Brazilian tapir	VU	VU	II	-	-
Artiodactyla	Tayassuidae	*Tayassu pecari*	white-lipped peccary	-	VU	II	-	hunting
Artiodactyla	Tayassuidae	*Pecari tajacu*	collared peccary	-	LC	II	-	hunting
Artiodactyla	Cervidae	*Mazama gouazoubira*	gray brocket	-	LC	-	-	hunting
Artiodactyla	Cervidae	*Ozotoceros bezoarticus*	Pampas deer	VU	NT	I	-	hunting
Rodentia	Caviidae	*Hydrochoerus hydrochaeris*	capybara	-	LC	-	-	hunting
Rodentia	Dasyproctidae	*Dasyprocta azarae*	Azara's agouti	-	DD	-	-	hunting

Source: eeCoo Sustainability (2022).

Caption: National threat status by MMA Ordinance No. 148/2022. International threat status by IUCN (2023). LC = Least Concern; DD = Data Deficient; NT = Near Threatened; VU = Vulnerable; EN = Endangered.

7.2.3.4. Ichthyofauna (Fish)

The studies conducted by eeCoo Sustentabilidade (2022) recorded a total of 20 fish species. One species, *Myloplus tiete* (pacu peva), is considered endangered at the national level according to MMA Ordinance No. 148/2022, falling into the Endangered category. Internationally (IUCN, 2023), 11 species are classified in the Least Concern category, as detailed in the following table. While not considered endangered, it's worth highlighting the species *Melanorivulus ofaie*. This species is endemic and occurs exclusively in the headwaters of the Verde River. Belonging to the Rivulidae family, it is known for being an annual fish species that lives for a short time (approximately three months) in seasonal waterways.

Of the 20 species, seven are of economic interest, either for commercial and subsistence fishing (five species) or as ornamental fish used in aquariums (two species).

Table 7-12- Ichthyofauna species found at Project Alpha.

Order	Family	Species	Common name	MMA Status	IUCN Status	Endemism	Economic interest
Characiformes	Parodontidae	*Parodon nasus*	hard-hitting	-	LC	-	-
Characiformes	Erythrinidae	*Hoplerythrinus unitaeniatus*	jejú	-	LC	-	fishing
Characiformes	Erythrinidae	*Hoplias mbigua*	traíra	-	-	-	fishing
Characiformes	Lebiasinidae	*Pyrrhulina australis*	pencil	-	-	-	ornamental
Characiformes	Anostomidae	*Leporinus friderici*	three-spotted piau	-	LC	-	fishing
Characiformes	Anostomidae	*Leporinus striatus*	charcuterie	-	LC	-	-
Characiformes	Bryconidae	*Salminus hilarii*	tabarana	-	-	-	fishing
Characiformes	Characidae	*Astyanax lacustris*	yellowtail lambari	-	LC	-	-
Characiformes	Characidae	*Knodus moenkhausi*	wrasse	-	LC	-	-
Characiformes	Characidae	*Moenkhausia bonita*	wrasse	-	LC	-	-
Characiformes	Characidae	*Piabarchus stramineus*	piaba	-	-	-	-
Characiformes	Characidae	*Piabina argentea*	piabão	-	-	-	-
Characiformes	Characidae	*Psalidodon* aff. *fasciatus*	red-tailed lambari	-	-	-	-
Characiformes	Characidae	*Serrapinnus notomelas*		-	LC	-	ornamental
Characiformes	Characidae	*Serrapinnus* sp.1		-	-	-	-
Characiformes	Serrasalmidae	*Myloplus tiete*	pacu peva	EN	-	-	fishing
Siluriformes	Loricariidae	*Hypostomus ancistroides*	hunchback	-	LC	-	-
Siluriformes	Loricariidae	*Hypostomus iheringii*	hunchback	-	LC	-	-
Cyprinodontiformes	Rivulidae	*Melanorivulus ofaie*	annual fish	-	-	yes	-
Cichliformes	Cichlidae	*Cichlasoma paranaense*	oak	-	LC	-	-

Source: eeCoo Sustentabilidade (2022).

Caption: National threat status by MMA Ordinance No. 148/2022. International threat status by IUCN (2023). LC = Least Concern; EN = Endangered.

7.2.3.5. General Fauna Discussion

Until the mid-1980s, the Project Alpha region had a significant native forest matrix, providing habitats with resources for the use of fauna. Gradually, this native vegetation was replaced by areas of agriculture and, above all, pasture. As a result, the general pattern is that more sensitive elements of the fauna become rarer, giving way to more resilient species. Species exclusive to forest areas also suffer from this transition, with species from open and grassland areas becoming more common.

The assessment carried out at Project Alpha (EECOO SUSTENTABILIDADE, 2022) illustrates this scenario. Herpetofauna species are generally good indicators of environmental quality since they have more restricted living areas, are semi-dependent on watercourses, and rely on the environment to regulate their body temperature. Thus, this group of vertebrates is the first to undergo changes in their community when there are alterations in the environment. Regarding herpetofauna, the species are all common, with a wide geographical distribution and no significant environmental requirements.

For groups with greater mobility and larger living areas, it is still possible to observe the presence of more demanding species, including those that are endangered, endemic, and rare. This is evident, for example, in the Birds and Terrestrial Mammals groups. These two groups predominantly consist of species with a wide geographical distribution, considered common and resilient to environmental changes (e.g., *Pitangus sulphuratus* - great kiskadee, *Vanellus chilensis* - southern lapwing, *Hydrochoerus hydrochaeris* - capybara, *Cerdocyon thous* - crab-eating fox). However, they still harbor species that serve as indicators of environmental quality, with representatives dependent on forest habitats (e.g. *Crypturellus undulatus* - undulated tinamou, *Penelope superciliaris* - rusty-margined guan, *Thalurania furcata* - fork-tailed woodnymph, *Sapajus cay* – hooded capuchin, *Tapirus terrestris* – Brazilian tapir, and *Priodontes maximus* - giant armadillo), and apex predators *(Geranoaetus albicaudatus* - white-tailed hawk, *Geranospiza caerulescens* - crane hawk, *Leopardus pardalis* - ocelot, *Puma concolor - puma*).

When considering the fauna species found at Project Alpha, 10 are classified as threatened with extinction on national or international lists (MMA Ordinance Nº 148/2022; IUCN, 2023), falling into the Vulnerable and Endangered categories. These species share two main causes for their threatened status: human hunting/fishing pressure and dependency on conserved natural habitats. Specifically, there are six Vulnerable species at the national level, six Vulnerable species at the international level, one Endangered species at the national level and one Endangered species at the international level.

Table 7-13- Endangered species found at Project Alpha - Categories "Vulnerable" and "Endangered".

Order	Family	Species	Common name	MMA status	IUCN Status
Galliformes	Cracidae	*Crax fasciolata*	bare-faced curassow	-	VU
Cingulata	Dasypodidae	*Priodontus maximus*	giant armadillo	VU	VU
Pilosa	Myrmecophagidae	*Myrmecophaga tridactyla*	giant anteater	VU	VU
Primates	Cebidae	*Sapajus cay*	hooded capuchin	VU	VU
Carnivora	Canidae	*Chrysocyon brachyurus*	maned wolf	VU	NT
Lagomorpha	Leporidae	*Sylvilagus brasiliensis*	common tapeti	-	EN
Perissodactyla	Tapiridae	*Tapirus terrestris*	Brazilian tapir	VU	VU
Artiodactyla	Tayassuidae	*Tayassu pecari*	white-lipped peccary	-	VU
Artiodactyla	Cervidae	*Ozotoceros bezoarticus*	Pampas deer	VU	NT
Characiformes	Serrasalmidae	*Myloplus tiete*	pacu peva	EN	-

Source: adapted from eeCoo Sustentabilidade (2022).

Caption: National threat status by MMA Ordinance No. 148/2022. International threat status by IUCN (2023). VU = Vulnerable; EN = Endangered; NT = Near Threatened.

Project Alpha and the entire region in which it is located, considering a radius of more than 50 km, have a matrix of anthropogenic use of agriculture, livestock, and forestry. Native and forested areas are scarce and fragmented. Considering that all the species mentioned above depend on conserved environments, it can be inferred that the populations of these species are not sustainable in the long term, since the environment will not provide the necessary resources (shelter, food, mating partners) for their maintenance. Here, the concept of critical habitat highlighted by Performance Standard 6 is crucial, which states:

> *"Critical Habitat*
>
> *16. Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes."*

Although Project Alpha has recorded endangered species, it is not possible to categorize is as a 'Critical Habitat,' especially given its highly anthropized nature. However, it is crucial to note that the forestry operation at Project Alpha will contribute to maintaining the preserved area, and with over 2,000 hectares dedicated to recovery, these environments, despite being part of an anthropized matrix, will offer significant ecological resources for fauna.

As mentioned earlier, all the endangered species found at Project Alpha face human hunting/fishing pressure and depend on conserved natural habitats. Considering the planned recovery efforts at Project Alpha, the protection provided by the company operation in this territory, and the environmental education actions related to hunting prevention, it can be concluded that the forestry operation will bring benefits to these wildlife elements. Additionally, as outlined in Chapter 12, the presence of these species is the focus of a specific Monitoring Program.

7.3. SOCIO-ECONOMIC ENVIRONMENT

The region where the municipalities of Camapuã, Figueirão and Costa Rica are located has a long tradition of livestock farming, dating back to the time of colonization. Traditionally, the region was occupied by indigenous Terenas and Caiapós who were located in practically the entire area that is now the state of Mato Grosso do Sul.

European colonization and later Jesuit missions contributed to the creation of small villages near the Camapuã stream and the Pardo River, where small port facilities helped develop the region, attracting the first migrants in the 17th and 18th centuries in search of gold and other valuable minerals.

The region began to develop again at the beginning of the 20th century with the installation of cattle ranches that accelerated the process of the municipality of Camapuã's emancipation, which took place on September 30th, 1948, through Law No. 134. After the emancipation of Camapuã, the region began to thrive due to livestock activities, encouraging the opening of new roads and attracting new migrants who came from other parts of Brazil in search of job opportunities.

The influx of new population contingents, along with the development of infrastructure in the region, allowed new population groups to give rise to new towns that were gradually emancipated. This is the case with the municipality of Costa Rica, originally a farm (Fazenda Imbirussú), which, due to its location, served as a crossing point for people using the route between Cuiabá and Santana do Paranaíba. The construction of road infrastructure in the region near the Sucuriú River allowed new housing for workers from the Imbirussú farm area to be built, giving rise to the town of Costa Rica in the early 1960s. The town became the District of Camapuã on January 21st, 1964 (Law No. 2,132) and was elevated to the category of municipality (Law No. 76, of May 12th, 1980), with the dismemberment of portions of the municipalities of Camapuã and Cassilândia.

The municipality of Figueirão was only emancipated in 2003, after being separated from Camapuã and Costa Rica. The municipality is named after the fig trees present in the area, dating back to the early 20th century. The region where the municipality of Figueirão is located began to be occupied in 1901 by families from the states of Minas Gerais and Goiás. Development in the region started in the 1950s when schools and churches were built in what is now the municipality's urban center. Figueirão was emancipated by State Law No. 2,680 of September 29th, 2023.

7.3.1. Area of Indirect Influence (AII)

7.3.1.1. Public Sector

A quantitative analysis was carried out in the municipalities of Camapuã, Costa Rica, and Figueirão, as detailed below. In the municipality of Figueirão, due to its potential indirect impact and smaller population, it was decided to also conduct a qualitative analysis through interviews with representatives of the municipal government and secretariats.

Representatives of the town hall, including the deputy mayor, the Agribusiness Coordinator, the Executive Advisor, and the Development Coordinator, along with representatives of the six secretariats active in the territory, pointed out that they recognize various positive aspects resulting from the enterprises and companies established in the municipality. This includes the generation of jobs and income, local development, and the possibility of social projects resulting from partnerships.

However, they also identified possible negative impacts that could arise with the arrival of large enterprises and companies. This could result in logistical challenges, pressure on infrastructure, roads, health services, education and social assistance in the territory.

The Secretary of Education, Culture and Sport reported that she had observed an increase in demand for school enrollment due to the migration of families from other regions, triggered by the arrival of new companies in the municipality. This was also confirmed by the Secretary for Social Assistance, who highlighted an increase in demand for donations and social assistance, as well as an increase in the number of registrations in the ‘Unified Registry’ (CadÚnico), which identifies and collects socio-economic information about low-income families in Brazil.

The company conducted a social survey to assess the possible impacts in the Area of Indirect Influence and concluded that the degree of impact is of little significance. This is because the number of outsourced employees housed in Figueirão, approximately 120 employees, represents around 3% of the local population, which totaled 3,539 inhabitants in 2022.

In the survey of potential social impacts carried out by the company, it is important to note that the work carried out in the planting and maintenance phases is temporary, not permanent, in accordance with forestry planning. Employees hired by companies providing services, from other cities and states, travel to the municipality of Figueirão and use only the accommodation provided by the contracting company. No families stay there; only employees use the facilities. These workers must adhere to the company's housing policy, which defines guidelines for conduct and behavior. In addition, the outsourced companies that use the lodgings need to follow internal regulations based on compliance with labor regulations to provide services to the company, ensuring workers conditions such as regular cleaning of the lodgings and the provision of food.

7.3.1.2. Population

The population living in the municipalities belonging to the AII has changed considerably over the years. In 1991, Camapuã had 15,501 residents, and by 2020, this number fell to 13,583, representing a drop of 12.37%, mainly due to the emancipation of Figueirão in 2005. Consequently, part of Camapuã's residents began to be counted in the new municipality.

Costa Rica's population, on the other hand, increased by 86.3% between 1991 and 2020, rising from 13,973 to 26,037 inhabitants in 2020. In comparison, the Brazilian population increased by 38.3% over the same period.

Finally, the municipality of Figueirão is the youngest among the components of the AII and has the smallest population, with 3,539 inhabitants in 2020. Between 2010 and 2020, Figueirão's population increased by 20.9%.

It is also worth noting that Figueirão has a rural population profile, with just under 50% of the population living in rural areas. Camapuã and Costa Rica, on the other hand, have an urban population profile.

Table 7-14 - Total, urban, and rural population in Brazil, Mato Grosso do Sul, Camapuã, Costa Rica, and Figueirão in the years 1991, 2000, 2010, and 2020*

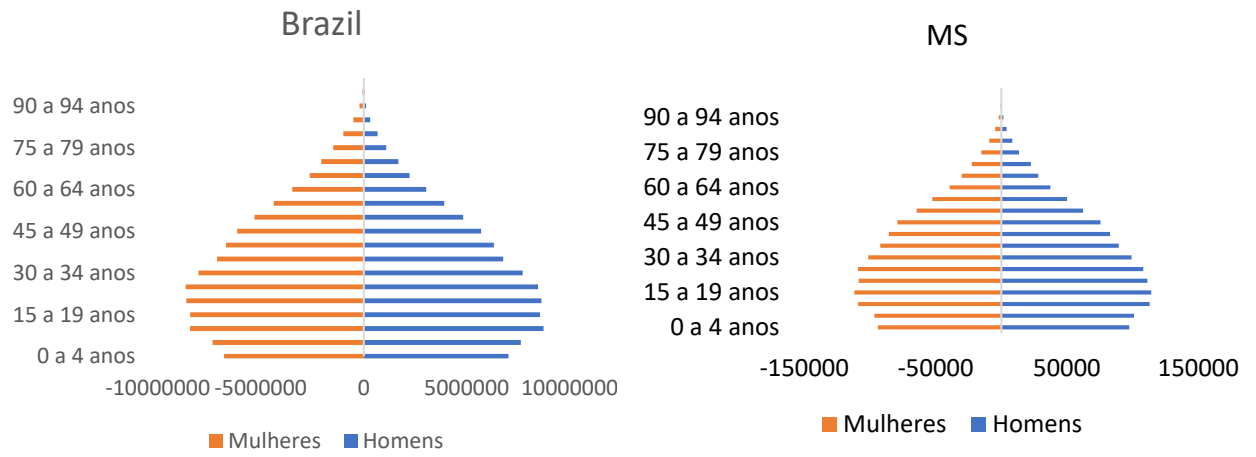
Year	Location	Brazil	Mato Grosso do Sul	Camapuã	Costa Rica	Figueirão
1991	Total	146,825,475	1,780,373	15,501	13,973	...
	Urban	110,990,990	1,414,447	9,503	9,005	...
	Rural	35,834,485	365,926	5,998	4,968	...
2000	Total	169,872,856	2,078,070	16,446	15,488	...
	Urban	137,925,238	1,746,893	10,613	11,483	...
	Rural	31,947,618	331,177	5,833	4,005	...

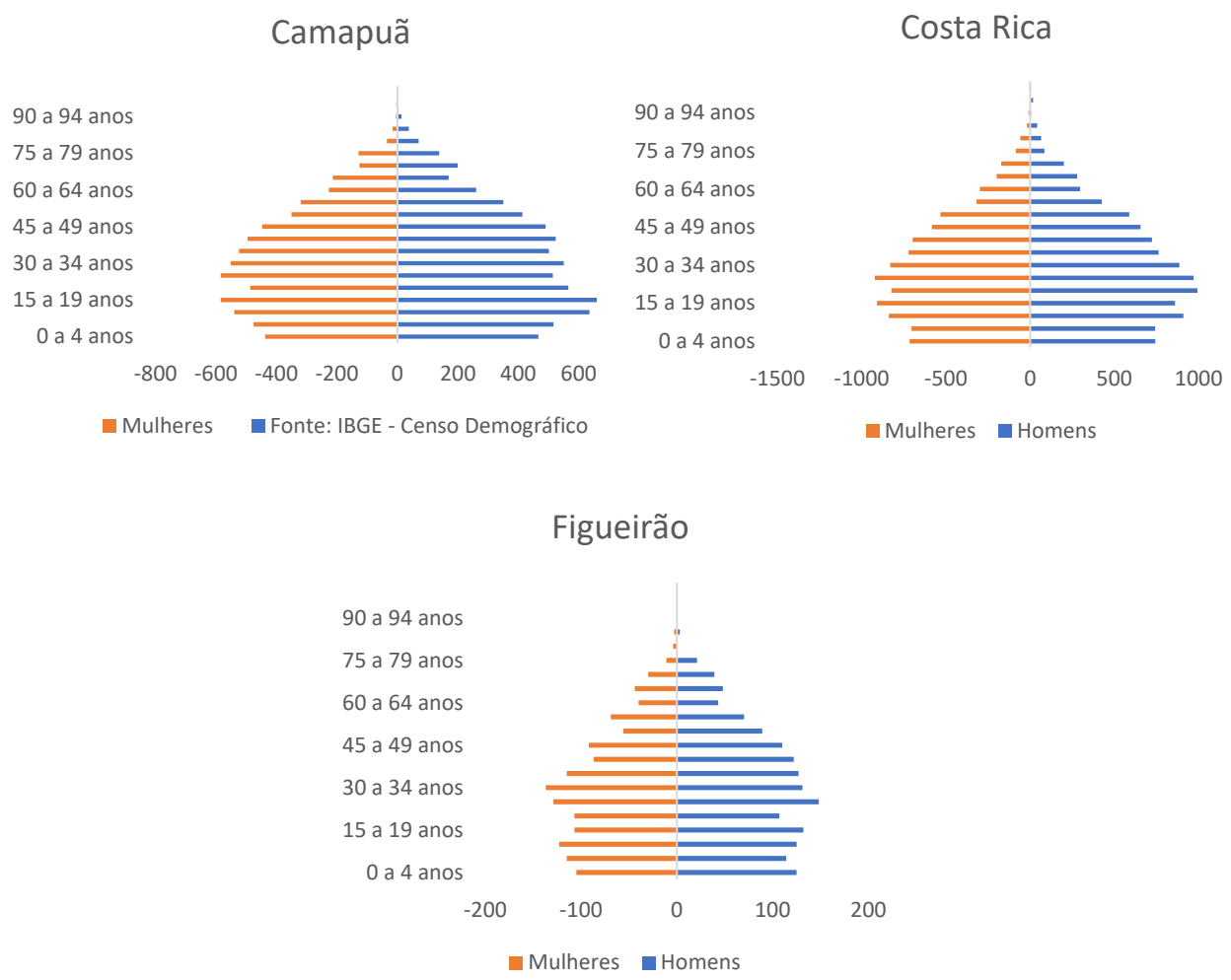
Year	Location	Brazil	Mato Grosso do Sul	Camapuã	Costa Rica	Figueirão
2010	Total	190,755,799	2,449,024	13,625	19,695	2,928
	Urban	160,934,649	2,097,238	9,797	16,848	1,530
	Rural	29,821,150	351,786	3,828	2,847	1,398
2020*	Total	203,062,512	2,756,700	13,583	26,037	3,539

*Until September 2023, IBGE did not provide information on rural and urban dwellers.
Source: IBGE (2023).

With regard to age composition, when comparing Brazil, Mato Grosso do Sul, Figueirão, Costa Rica, and Camapuã, it is possible to see that all the territorial units analyzed have the same age pattern. They are all experiencing a decrease in the base of the pyramid, with families having fewer children. Thus, from a long-term perspective, if this scenario continues, there is a tendency for the pyramid to shift, resulting in an ageing population. This phenomenon is described in the literature as demographic transition and, in a nutshell, is a demographic phenomenon that all countries in the world are facing. It is characterized by a fall in birth rates and an increase in longevity. This phenomenon is responsible for the aging of populations, as already seen in Europe and it tends to occur in Brazil in the coming decades (VASCONCELOS & GOMES, 2012). In the case of the municipalities in the AII, in 2010, there was a concentration of people of working age, with less pressure on education and services for the elderly.

Table 7-15 - Population pyramid. Brazil, Mato Grosso do Sul, Camapuã, Costa Rica, and Figueirão (2010).





Source: IBGE (2023).

7.3.1.3. Households

This section provides information on the households where the inhabitants of the municipalities in the AII live, such as the situation of the households, the form of water supply, sanitary drainage, solid waste collection and access to electricity. The information presented is based on the 2010 and 2022 Demographic Census (preliminary results) and refers to data from the National Sanitation Information System for the municipalities of Figueirão, Costa Rica, and Camapuã. The indicators for each municipality are detailed below:

➢ **Figueirão:**

- Only 3.9% of households have adequate sewage disposal.
- 91.7% of urban households on public roads have trees.
- Only 2.7% of urban households on public roads have adequate urbanization, including culverts, sidewalks, paving, and curbs.

➢ **Costa Rica:**

- 45.6% of households have adequate sanitation.
- 92.7% of urban households on public roads have trees.
- 33.7% of urban households on public roads have adequate urbanization, including culverts, sidewalks, paving, and curbs.

➢ **Camapuã:**

- 48.8% of households have adequate sewage disposal.
- 99% of urban households on public roads have trees.
- Only 16% of urban households on public roads have adequate urbanization, including culverts, sidewalks, paving, and curbs.

These statistics show the current situation of sanitation and urban infrastructure in the respective municipalities, indicating different levels of service in each area.

In total, there are 11,920 households in the AII, of which 9,408 are in urban areas (78.9%) and 2,512 are in rural areas (21.1%). It is worth noting that households in rural areas in Figueirão represent 46.6% of the total, while it is 24.7% in Camapuã, and 14.5% in Costa Rica.

This variation in the percentages of population in urban and rural areas may be linked to the economic potential of the municipalities of Figueirão and Camapuã, as their local economies are focused on the agricultural sector, as it will be detailed below.

Table 7-16 - Household situation in Camapuã, Costa Rica, and Figueirão.

Situation	Camapuã		Costa Rica		Figueirão		Grand Total	
	N	%	N	%	N	%	N	%
Rural	1,090	24.7%	939	14.5%	483	46.6%	2,512	21.1%
Urban	3,320	75.3%	5,534	85.5%	554	53.4%	9,408	78.9%
Total	4,410	100.0%	6,473	100.0%	1,037	100.0%	11,920	100.0%

Source: IBGE (2023).

In the AII, just over half of the houses are owned and already paid off, accounting for 54.1% of the 11,906 existing homes. Additionally, 20.5% of the homes are rented, 12.7% are provided by the employer, 6.9% are purchased, 5.7% are provided in another way, and 0.2% fall into another condition. It is worth noting that in Figueirão, 31.9% of the 1,037 houses are provided by employers, possibly related to the large number of rural properties in the territory. Farm animal caretakers and their families live in the 483 existing rural homes.

Table 7-17 - Household situation in Camapuã, Costa Rica, and Figueirão.

Property situation	Camapuã		Costa Rica		Figueirão		Total	
	N	%	N	%	N	%	N	%
Own house	2,540	57.6%	3,392	52.5%	506	48.8%	6,438	54.1%
Rented	770	17.5%	1,558	24.1%	112	10.8%	2,440	20.5%
Transferred otherwise	306	6.9%	341	5.3%	28	2.7%	675	5.7%
Transferred by employer	515	11.7%	663	10.3%	331	31.9%	1,509	12.7%
Under acquisition	269	6.1%	496	7.7%	60	5.8%	825	6.9%
Another condition	10	0.2%	9	0.1%	0	0.0%	19	0.2%
Total	4,410	100%	6,459	100%	1,037	100.0%	11,906	100%

Source: IBGE (2023).

As for water supply, in 2010, 81.6% of households were supplied by the distribution network, 14.7% (1,750 homes) were supplied by wells or springs, and only 3.7% (439 homes) were supplied otherwise. It is worth noting that in Figueirão, 40.8% of households are supplied by wells or springs, which is linked to the fact that 46% of households are in rural areas and, therefore, less likely to have a water distribution network from the water company.

Table 7-18- Type of water supply in Camapuã, Costa Rica, and Figueirão.

Water supply	Camapuã		Costa Rica		Figueirão		Grand Total	
	N	%	N	%	N	%	N	%
Well or spring	654	14.8%	673	10.4%	423	40.8%	1,750	14.7%
Distribution network	3,639	82.5%	5,507	85.3%	571	55.1%	9,717	81.6%
Other	117	2.7%	279	4.3%	43	4.1%	439	3.7%
Total	4,410	100.0%	6,459	100.0%	1,037	100.0%	11,906	100.0%

Source: IBGE (2023).

With regard to drainage, out of the 11,906 households, 11,871 have some kind of drainage system. Among these, 6,350 or 53.5% are rudimentary cesspits, particularly notable in Figueirão, where 93.4% have this type of drainage. The next most common type is the sewerage system, found in 4,112 households, accounting for 34.6% of the total.

Table 7-19- Types of sewage disposal in Camapuã, Costa Rica, and Figueirão.

Sewage disposal	Camapuã		Costa Rica		Figueirão		Total	
	N	%	N	%	N	%	N	%
Sewerage system	2,179	49.7%	1,920	29.8%	13	1.3%	4,112	34.6%
Rudimentary cesspit	1,932	44.0%	3,450	53.5%	968	93.4%	6,350	53.5%
Septic tank	153	3.5%	1,041	16.1%	33	3.2%	1,227	10.3%
River, lake or sea	72	1.6%	12	0.2%	4	0.4%	88	0.7%
Ditch	31	0.7%	14	0.2%	12	1.2%	57	0.5%
Other	19	0.4%	12	0.2%	6	0.6%	37	0.3%
Total	4,386	100.0%	6,449	100.0%	1,036	100.0%	11,871	100.0%

Source: IBGE (2023).

With regard to garbage collection, 10,035 households (84.3%) in the AII have garbage collected. Of this, 97.2% is collected by the garbage collection service, and 2.8% is collected in containers. Among the 1,871 households (15.7%) that don't have their waste collected, the majority is buried on the property, accounting for 51%, followed by other disposal (27.4%), and empty lots (9.4%). As with the other sanitation indicators, Figueirão, due to its rural characteristics, has a high percentage of waste that is not collected by the garbage collection service (40%).

Table 7-20 - Waste disposal. Camapuã, Costa Rica, and Figueirão.

Garbage collection	Camapuã		Costa Rica		Figueirão		Total	
	N	%	N	%	N	%	N	%
Garbage collected	**3,634**	**82.4%**	**5,782**	**89.5%**	**619**	**60%**	**10,035**	**84.3%**
Collected in containers	26	0.7%	249	4.3%	2	0%	277	2.8%
Garbage collection service	3,608	99.3%	5,533	95.7%	617	100%	9,758	97.2%
Not collected	**776**	**17.6%**	**677**	**10.5%**	**418**	**40%**	**1,871**	**15.7%**
Other disposal	81	10.4%	127	16.4%	5	1%	213	27.4%
Empty lot	50	6.4%	20	2.6%	3	0%	73	9.4%
Buried on the property	156	20.1%	99	12.8%	141	18%	396	51.0%
River, lake or sea	5	0.6%	0	0.0%	1	0%	6	0.8%
Burnt on the property	484	62.4%	431	55.5%	268	35%	1,183	152.4%
Total	4,410	100%	6,459	100.0%	1,037	100%	11,906	100.0%

Source: IBGE (2023).

Finally, 10,350 households (86.9%) is supplied with electricity through an exclusive meter, while 1,370 (11.5%) use a meter shared with one or more households. Only 45 households (0.4%) do not have access to electricity.

Table 7-21 – Electricity supply in Camapuã, Costa Rica, and Figueirão.

Type of energy	Camapuã		Costa Rica		Figueirão		Grand Total	
	N	%	N	%	N	%	N	%
Exclusive meter	3,894	88.3%	5,478	84.8%	978	94.3%	10,350	86.9%
Shared meter	440	10.0%	890	13.8%	40	3.9%	1,370	11.5%
Informal energy	50	1.1%	57	0.9%	3	0.3%	110	0.9%
No electricity	10	0.2%	20	0.3%	15	1.4%	45	0.4%
Other energy sources	16	0.4%	14	0.2%	1	0.1%	31	0.3%
Total	4,410	100.0%	6,459	100.0%	1,037	100.0%	11,906	100.0%

Source: IBGE (2023).

7.3.1.4. Economy

Regarding the economy of municipalities, it is important to highlight both their economic power through the analysis of Gross Domestic Product (GDP), economic potential through the analysis of Gross Value Added (GVA), and the local labor market.

In terms of economic performance between 2002 and 2020, an analysis of nominal GDP, i.e., without correcting the figures according to inflation over the period, shows that Costa Rica experienced the greatest proportional increase in GDP, with a growth of 732.5% from R$121,404,000 to R$1,966,409, between 2002 and 2020. Camapuã's GDP grew by 344.8% (from R$121,404,000.00 to R$540,041,000.00) during the same period, while Figueirão's GDP grew by 241.6% between 2005 (the year of its emancipation) and 2020, from R$37,093,000 to R$126,741,000.00.

Only Costa Rica's development was proportionally higher than the growth in state and national GDP. While the GDP of the state of Mato Grosso do Sul grew by 645.8% during the period, Brazil's GDP grew by 411.12%. It is worth noting that this growth does not include monetary correction according to inflation in the period.

Table 7-22 - Gross Domestic Product (x1,000). Brazil, Mato Grosso do Sul, Camapuã, Costa Rica, and Figueirão (2002 to 2020).

Year	Brazil	Mato Grosso do Sul	Camapuã	Costa Rica	Figueirão
2002	BRL 1,488,787,276.00	BRL 16,440,424.00	BRL 121,404.00	BRL 236,191.00	...
2003	BRL 1,717,950,386.00	BRL 21,846,566.00	BRL 156,999.00	BRL 356,586.00	...
2004	BRL 1,957,751,224.00	BRL 23,372,308.00	BRL 163,398.00	BRL 398,725.00	...
2005	BRL 2,170,584,503.00	BRL 23,725,258.00	BRL 139,258.00	BRL 318,724.00	BRL 37,093.00
2006	BRL 2,409,449,916.00	BRL 26,667,894.00	BRL 144,090.00	BRL 275,558.00	BRL 34,055.00
2007	BRL 2,720,262,951.00	BRL 30,084,765.00	BRL 158,798.00	BRL 358,566.00	BRL 35,050.00
2008	BRL 3,109,803,097.00	BRL 36,219,263.00	BRL 190,159.00	BRL 455,059.00	BRL 40,354.00
2009	BRL 3,333,039,339.00	BRL 39,517,742.00	BRL 217,330.00	BRL 476,490.00	BRL 46,171.00

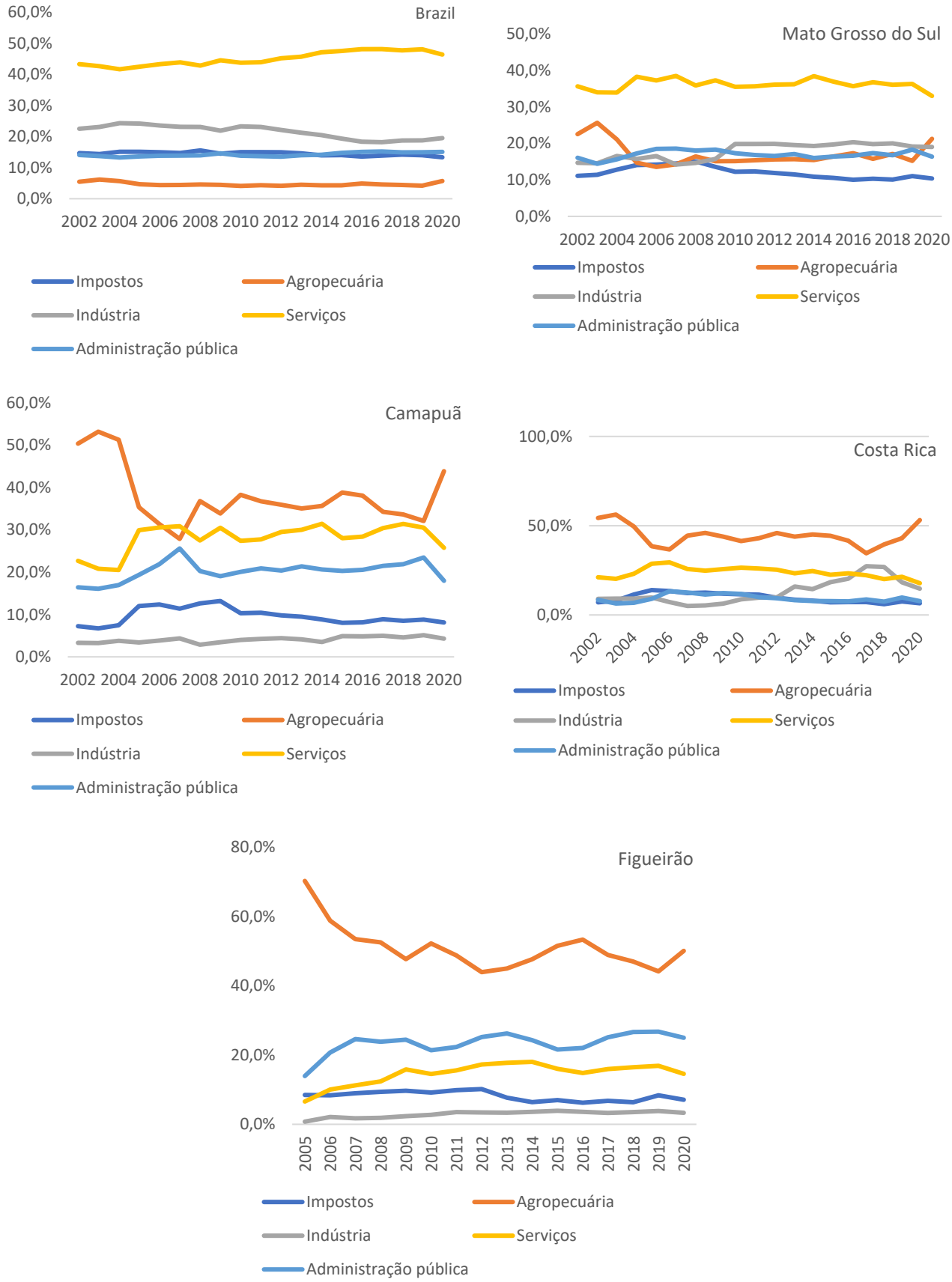
Year	Brazil	Mato Grosso do Sul	Camapuã	Costa Rica	Figueirão
2010	BRL 3,885,847,000.00	BRL 47,270,656.00	BRL 225,731.00	BRL 544,859.00	BRL 52,999.00
2011	BRL 4,376,382,000.00	BRL 55,133,162.00	BRL 246,896.00	BRL 753,991.00	BRL 58,231.00
2012	BRL 4,814,760,000.00	BRL 62,013,201.00	BRL 269,476.00	BRL 923,157.00	BRL 56,546.00
2013	BRL 5,331,618,957.00	BRL 69,203,201.00	BRL 296,455.00	BRL 1,059,655.00	BRL 61,517.00
2014	BRL 5,778,952,780.00	BRL 78,950,133.00	BRL 324,496.00	BRL 1,150,491.00	BRL 72,680.00
2015	BRL 5,995,787,000.00	BRL 83,082,555.00	BRL 355,421.00	BRL 1,294,608.00	BRL 85,506.00
2016	BRL 6,269,328,000.00	BRL 91,892,285.00	BRL 398,006.00	BRL 1,494,111.00	BRL 95,817.00
2017	BRL 6,585,479,000.00	BRL 96,396,434.00	BRL 408,816.00	BRL 1,482,228.00	BRL 96,498.00
2018	BRL 7,004,141,000.00	BRL 106,969,142.00	BRL 435,283.00	BRL 1,822,861.00	BRL 96,211.00
2019	BRL 7,389,131,000.00	BRL 106,943,246.00	BRL 423,338.00	BRL 1,533,746.00	BRL 105,022.00
2020	BRL 7,609,597,000.00	BRL 122,627,726.00	BRL 540,041.00	BRL 1,966,409.00	BRL 126,741.00

Source: IBGE (2023).

In addition to the size of the economy, measured by GDP, it is crucial to examine the economic potential of municipalities—i.e., which sectors of the economy predominate, employ the majority of the population, and drive commerce. To achieve this, we use Gross Value Added (GVA), which breaks down Gross Domestic Product into the following sectors: Industry, Agriculture, Taxes, Public Administration, and Services.

The municipalities in the AII share a commonality in that agriculture predominates in their local economies. In 2020, it accounted for 43.8% of Camapuã's economy, 53.2% of Costa Rica's, and 50.1% of Figueirão's. Additionally, Camapuã and Costa Rica boast a developed service sector, constituting 25.8% and 17.8%, respectively. For comparison, the GDPs of Brazil and Mato Grosso do Sul reveal a predominance of the services sector, comprising 46.4% and 33%, respectively.

Figure 7-34 - Gross Value Added - GVA. Brazil, Mato Grosso do Sul, Camapuã, Figueirão, and Costa Rica (2002 to 2020).



Source: IBGE (2023).

Regarding the number of employees hired, the analysis of information from the Annual Social Information Report (RAIS) informs that between 2019 and 2021, there was no significant variation in the number of formal workers in the municipalities analyzed. In 2019, the totals were 2,655 (Camapuã), 6,101 (Costa Rica), and 619 (Figueirão). Meanwhile, in 2021, Camapuã showed an increase of 4.2% compared to 2019, closing with 2,767 workers. Costa Rica saw a 1.3% increase, and Figueirão saw a 7.1% increase.

On the other hand, in 2021, the sector that employed the most people in Camapuã was agriculture, with 39 out of the 2,767 active jobs. In Costa Rica, the sector that employed the most people was services, constituting 30.4% of jobs. Finally, Figueirão had the majority of its formal workforce linked to agriculture, with 49.6% of the 663 jobs.

Table 7-23 - Number of workers by sector. Camapuã, Costa Rica, and Figueirão (2019, 2020 and 2021).

Sector	2019			2020			2021		
	Camapuã	Costa Rica	Figueirão	Camapuã	Costa Rica	Figueirão	Camapuã	Costa Rica	Figueirão
Industry	62	1,377	5	59	1,182	7	57	1,326	3
	2.3%	22.6%	0.8%	2.3%	21.0%	1.3%	2.1%	21.4%	0.5%
Construction	32	76	0	15	58	1	16	68	2
	1.2%	1.2%	0.0%	0.6%	1.0%	0.2%	0.6%	1.1%	0.3%
Trade	580	1,362	65	588	1,409	61	599	1,555	83
	21.8%	22.3%	10.5%	23.1%	25.0%	10.9%	21.6%	25.1%	12.5%
Services	985	1,869	246	867	1,580	207	1,030	1,877	246
	37.1%	30.6%	39.7%	34.1%	28.0%	37.0%	37.2%	30.4%	37.1%
Agriculture	996	1,417	303	1,014	1,406	283	1,065	1,358	329
	37.5%	23.2%	48.9%	39.9%	25.0%	50.6%	38.5%	22.0%	49.6%
Total	2,655	6,101	619	2,543	5,635	559	2,767	6,184	663
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Annual Social Information Report - RAIS (2023).

Regarding economic aspects, it is important to note that Figueirão has a poorly diversified and underdeveloped economy, primarily due to its small population of only 3,559 inhabitants. This sets it apart from Costa Rica and Camapuã, which, despite being medium and small-sized municipalities, have more diversified economies. Camapuã exhibits a greater presence of service activities, while Costa Rica features a mix of services and industry.

As a result, Figueirão's socio-economic characteristics, including its small population and limited economic diversity, make the municipality more susceptible to potential impacts during the arrival of new enterprises. This is especially true for medium and large businesses, as the influx of a considerable number of workers and residents in a short period can significantly alter the dynamics of public services and the local labor market.

7.3.1.5. Education

The educational aspects covered here pertain to the total number of schools in the municipalities, their location, types of education offered and size. In addition, the total number of students will be presented, according to type of education, as well as the number of teachers.

According to information from INEP's School Catalog[9], there are 33 schools in the municipalities analyzed – 14 in Camapuã, 16 in Costa Rica, and three in Figueirão. Among these schools, 28 are public (seven under state administration and 21 under municipal administration), and there are five private schools, three in Camapuã and two in Costa Rica.

Table 7-24 - Number of schools. Camapuã, Costa Rica, and Figueirão (2023).

Municipality	State	Municipal	Private	Total
Camapuã	4	7	3	14
Costa Rica	2	12	2	16
Figueirão	1	2		3
Total	7	21	5	33

Source: School Catalog. INEP (2023).

Among the schools, only two are rural – one in Camapuã and the other in Costa Rica. It is worth noting that there is a multigrade classroom in the Area of Direct Influence in the rural area of Figueirão. However, the class is associated with Professor Antônio Inacio Furtado Municipal School, located in the community of Santa Bárbara.

Table 7-25 - Total number of schools by location. Camapuã, Costa Rica, and Figueirão (2023).

Municipality	Rural	Urban	Total
Camapuã	1	13	14
Costa Rica	1	15	16
Figueirão	-	3	3
Total	2	31	33

Source: School Catalog. INEP (2023).

[9] https://www.gov.br/inep/pt-br/acesso-a-informacao/dados-abertos/inep-data/catalogo-de-escolas

In terms of the size of these schools, 15 schools have between 201 and 500 students (six in Camapuã, seven in Costa Rica, and two in Figueirão). Additionally, 10 schools have between 51 and 200 students, six in Camapuã, three in Costa Rica, and one in Figueirão.

Table 7-26 - Total number of schools according to school size (number of students). Camapuã, Costa Rica, and Figueirão (2023)

Municipality	Up to 50 students	Between 51 and 200 students	Between 201 and 500 students	Between 501 and 1000 students	Total
Camapuã	1	6	6	1	14
Costa Rica	-	3	7	6	16
Figueirão	-	1	2	-	3
Total	1	10	15	7	33

Source: School Catalog. INEP (2023).

In terms of the types of education provided, ten schools offer only early childhood education, ten provide both early childhood and primary education, four offer primary and secondary education, three focus solely on primary education, and two provide both primary education and youth and adult education.

Table 7-27 - Total number of schools by type of education offered. Camapuã, Costa Rica, and Figueirão (2023).

Type of education	Camapuã	Costa Rica	Figueirão	Grand Total
Early childhood education	3	6	1	10
Kindergarten, Elementary School	5	4	1	10
Kindergarten, Elementary School, High School	1	-	-	1
Elementary School	-	3	-	3
Elementary School, Young Adult Education	1	1	-	2
Elementary School, High School	2	1	1	4
Elementary School, High School, Youth and Adult Education	-	1	-	1
Elementary school, Secondary school, Vocational	1	-	-	1
High School	1	-	-	1
Total	**14**	**16**	**3**	**33**

Source: School Catalog. INEP (2023).

Table 7-28 - List of schools in the municipalities of the AII

School name	Municipality	Location	Address	Phone number	Administration	School size	Stages and Type of Educational Service
Camapuã Special Education Center - MS	Camapuã	Urban	Rua Francisco Faustino, 429 Jardim Nova Era. 79420-000	(67) 32862435	Private	Between 51 and 200 students	Elementary School, Young Adult Education
EE Camilo Bonfim	Camapuã	Urban	Rua dos Jesuítas, 965 Centro. 79420-000	(67) 32861740	State	Between 201 and 500 students	Elementary School, High School
EE Miguel Sutil	Camapuã	Urban	Rua Francisco Faustino, 340 Centro. 79420-000	(67) 32861883	State	Between 501 and 1000 students	Elementary school, Secondary school, Vocational
Claudio Jose de Lima Municipal School	Camapuã	Urban	Paraíba, 194 São Miguel. 79420-000	(67) 32862287	Municipal	Between 201 and 500 students	Kindergarten, Elementary School
Lucas Alves do Valle Municipal School - Pole	Camapuã	Urban	Rua Alaor P Goncalves, 0 Coophavalle. 79420-000	(67) 32862430	Municipal	Between 201 and 500 students	Kindergarten, Elementary School
Dr. Sudalydio Rodrigues Machado Municipal School	Camapuã	Urban	Alvino Antônio Martins, 1130 Vl Izolina A Barro. 79420-000	(67) 32861521	Municipal	Between 201 and 500 students	Kindergarten, Elementary School
Ernesto Solon Borges Municipal School	Camapuã	Urban	Ferreira da Cunha, 200 Vl Diamantina. 79420-000	(67) 32861737	Municipal	Between 201 and 500 students	Kindergarten, Elementary School
Eurico Gaspar Dutra Municipal School	Camapuã	Urban	Amazonas, 0 Vl Industrial. 79420-000	(67) 32862387	Municipal	Between 51 and 200 students	Kindergarten, Elementary School
Monteiro Lobato School	Camapuã	Urban	Rua Bonfim, 129 Centro. 79420-000		Private	Between 51 and 200 students	Kindergarten, Elementary School, High School

School name	Municipality	Location	Address	Phone number	Administration	School size	Stages and Type of Educational Service
EE Dr. Arnaldo Estevão de Figueiredo	Figueirão	Urban	Rua Custodio, 420 Prédio. Vila Maria. 79428-000	(67) 32741396	State	Between 201 and 500 students	Elementary School, High School
EE Jose Ferreira da Costa	Costa Rica	Urban	Avenida Jose Ferreira da Costa, 1374 Center. 79550-000	(67) 32471066	State	Between 501 and 1000 students	Elementary School, High School, Youth and Adult Education
EE Santos Dumont	Costa Rica	Urban	Rua Jose Pereira da Silva, 406 Jardim Santos Dumont. 79550-000	(67) 32472938	State	Between 501 and 1000 students	Elementary School, High School
Francisco Martins Carrijo Municipal School	Costa Rica	Urban	Francisco Martins Carrijo, 316 Vila São Francisco. 79550-000	(67) 32472146	Municipal	Between 501 and 1000 students	Elementary School
Joaquim Faustino Rosa Municipal School	Costa Rica	Urban	Rua Tercio Teixeira Machado, 1161 Residencial Figueira. 79550-000	(67) 32472111	Municipal	Between 501 and 1000 students	Elementary School
Vale do Amanhecer Municipal School	Costa Rica	Urban	Rua Adonel Dias da Costa, 252 Vale do Amanhecer. 79550-000	(67) 32471872	Municipal	Between 501 and 1000 students	Kindergarten, Elementary School
Costa Rica Educational Cooperative - COOPECRI	Costa Rica	Urban	Avenida Jose Ferreira da Costa, 427 House. Center. 79550-000	(67) 32471128	Private	Between 51 and 200 students	Kindergarten, Elementary School
Ambrosina Paes Coelho Children's Education Center	Costa Rica	Urban	Rua Laerte Souza da Costa, 190 Centro. 79550-000	(67) 32476911	Municipal	Between 201 and 500 students	Early childhood education

School name	Municipality	Location	Address	Phone number	Administration	School size	Stages and Type of Educational Service
EE Joaquim Malaquias da Silva	Camapuã	Rural	Av. Joaquim Malaquias da Silva, 900 Center. 79424-000	(67) 37111013	State	Between 201 and 500 students	Elementary School, High School
Municipal Civic-Military School Professor Adenocre Alexandre de Morais	Costa Rica	Urban	Rua Jose Calazans da Silva, 172 Centro. 79550-000	(67) 32476970	Municipal	Between 201 and 500 students	Elementary School, Youth and Adult Education
Menino Jesus Nursery School - Camapuã Children's Support Association	Camapuã	Urban	Rua Campo Grande, 150 Prédio. Jardim das Palmares. 79420-000	(67) 32862018	Private	Between 51 and 200 students	Early childhood education
Costa Rica Education Institute - Apae	Costa Rica	Urban	Rua Dezessete de Junho, 334 São Francisco. 79550-000	(67) 32471699	Private	Between 51 and 200 students	Kindergarten, Elementary School
Cotrisa de Baus Polo Municipal School	Costa Rica	Rural	Br 359 Km 13, Baus District. Rural area. 79550-000	(67) 32491141	Municipal	Between 51 and 200 students	Kindergarten, Elementary School
Maria Rufina de Jesus Madruga Children's Education Center	Camapuã	Urban	Cuiabá, S/N Vl Industrial. 79420-000	(67) 32861986	Municipal	Up to 50 students	Early childhood education
Sonho Meu Early Childhood Education Center	Costa Rica	Urban	Rua Lauristides Martins Carrijo, 333 São Francisco. 79550-00.	(67) 32476907	Municipal	Between 201 and 500 students	Early childhood education
Prof. Antônio Inacio Furtado Municipal School - Pole	Figueirão	Urban	Rua Castro Alves, 520 Jardim Barreto. 79428-000	(67) 32741254	Municipal	Between 201 and 500 students	Kindergarten, Elementary School

School name	Municipality	Location	Address	Phone number	Administration	School size	Stages and Type of Educational Service
Davina Correa de Oliveira Children's Education Center	Costa Rica	Urban	Rua Esmeria Borges Nunes, 605 Escola. Vila Nunes. 79550-000	(67) 32476918	Municipal	Between 201 and 500 students	Early childhood education
Sonho de Ninar Early Childhood Education Center	Costa Rica	Urban	Rua Adonel Dias Costa, 220 Vale Do Amanhecer. 79550-000	(67) 32476920	Municipal	Between 201 and 500 students	Early childhood education
Ilidia Lacerda de Almeida Children's Education Center	Costa Rica	Urban	Rua Domingos Augusto Coelho, 170 Jardim Santos Dumont. 79550-000	(67) 32476903	Municipal	Between 201 and 500 students	Early childhood education
Iraides Goncalves de Medeiros Teca Early Childhood Education Center	Camapuã	Urban	Av. Areado, 520 Chácara Brilhante - Bloco 01. 79420-000	(67) 32864834	Municipal	Between 51 and 200 students	Early childhood education
Marcio Elias Nery State College of Teacher Education	Camapuã	Urban	Br 060, Km 215, S/N Vila Industrial. 79420-000	(67) 32861017	State	Between 51 and 200 students	High School
Francisco Rogerio Barbosa Oliveira Municipal Nursery School	Figueirão	Urban	Rua Claudio Jose de Lima, 1070 Prédio. Vila Maria. 79428-000	(67) 32741062	Municipal	Between 51 and 200 students	Early childhood education
Fabio Rodrigues Barbosa Municipal School	Costa Rica	Urban	Rua Jose Braulino De Souza, 206 Jardim Imbirussu. 79550-000	(67) 32476930	Municipal	Between 501 and 1000 students	Elementary School

School name	Municipality	Location	Address	Phone number	Administration	School size	Stages and Type of Educational Service
Sonho da Vovó Children's Education Center	Costa Rica	Urban	Rua Maria Rosa de Jesus, 315 Jardim Imbirussu. 79550-000	(67) 32476901	Municipal	Between 201 and 500 students	Early childhood education

Source: School Catalog. INEP (2023).

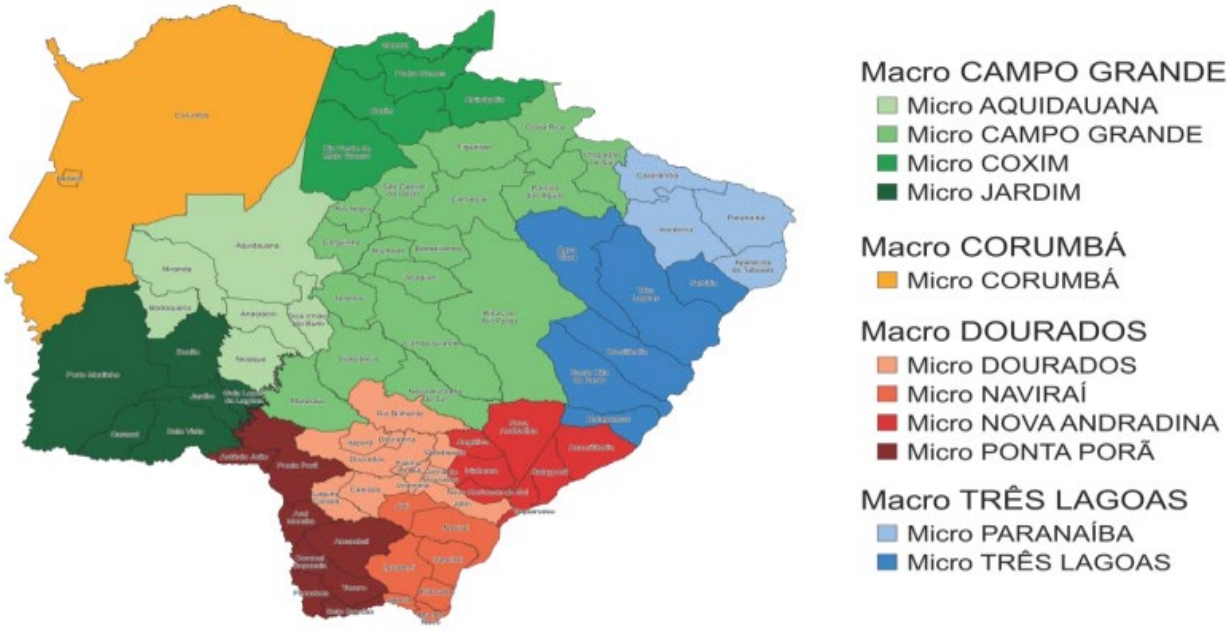
7.3.1.6. Healthcare

Understanding the healthcare structure and dynamics of the municipalities is essential for assessing the potential impacts of the arrival of any undertaking. The Unified Healthcare System (SUS) has a service logistics that includes the territorial division into different healthcare regions. Consequently, there is a hierarchy of services, wherein smaller municipalities focus on primary healthcare services, and cases requiring more attention are referred to the regional hubs. The influx of new businesses can attract a significant number of people, both employees and their family members, thereby exerting pressure on healthcare systems.

As outlined in the Mato Grosso do Sul State Healthcare Planning (2020 to 2023), the decentralization of healthcare in the state aligns with national directives. The regionalization process has led to the establishment of four healthcare regions (as per Resolution 04/SES/MS/2013, amended by Resolution no. 90/SES/MS of November 11th, 2014).

Camapuã, Figueirão, and Costa Rica are located within the Campo Grande region, encompassing both the macro and micro healthcare regions. According to the logistics implemented by the SUS, the municipalities of the AII provide the first two stages of healthcare (low and medium complexity) and refer patients in highly complex situations to the capital city, Campo Grande.

Figure 7-35 - Macroregions and microregions of the state of Mato Grosso do Sul.



Source: Mato Grosso do Sul State Health Plan (2023).

Concerning the infrastructure of municipal healthcare services, the most effective way to access information on existing facilities is through the DataSus portal. This portal allows users to consult and download personalized healthcare charts. However, the website underwent maintenance in August and September, rendering it temporarily inaccessible for consultation. As an interim measure, the municipalities' websites were checked to identify healthcare facilities in Figueirão and Camapuã. Costa Rica's municipal administration does not provide information on public facilities, so the search was conducted through a portal which contains a list of some of the existing healthcare facilities. Thus, it is understood that the number of existing units may be underestimated.

The survey identified 29 healthcare facilities in the three municipalities, comprising 13 primary healthcare units, three hospitals (one in each municipality), two laboratories, two clinics, two pharmacies, and two sanitary enforcement units. Additionally, a psychosocial care center (CAPS) was identified in Camapuã.

Given its small size, Figueirão also has a limited number of healthcare facilities. During discussions with municipal secretaries, it was revealed that the influx of new residents in the municipality is already impacting the service capacity of the municipal healthcare units, leading to delays in meeting demands.

Table 7-29 - Number of healthcare facilities in the municipalities in the AII

Type of equipment	Camapuã	Figueirão	Costa Rica	Total
Warehouse	1	-	-	1
CAPS	1	-	-	1
Clinic	1	1	-	2
Endemics	-	1	-	1
Pharmacy	1	1	-	2
Hospital	1	1	1	3
Laboratory	1	1	-	2
Regulation	1	-	-	1
Emergency Ambulance Service	1	-	-	1
Primary Healthcare Unit	7	1	5	13
Sanitary Enforcement	1	1	-	2
Total	16	7	6	29

Source: Figueirão City Hall. Camapuã City Hall and Health Post Portal (2023).

Below is a list of the healthcare facilities identified.

Table 7-30 - List of health care facilities in the municipalities in the AII

Municipality	Type	Name	Telephone	Address
Figueirão	Hospital	Mariana Silvério Furtado Municipal Hospital	(67) 3274-1146	Av. Moisés de Araújo Galvão, 1595. Center
Figueirão	Primary Healthcare Unit	Arindo Rodrigues da Silva Primary Healthcare Unit	(67) 3274-1128	Rua Santos Dumont, 245. Jardim Aeroporto
Figueirão	Endemics	Vector and Endemic Disease Control	(67) 3274-1209	Av. Moisés de Araújo Galvão, 1595. Center
Figueirão	Clinic	Municipal Clinic	(67) 3274-1209	Av. Moisés de Araújo Galvão, 1595. Center
Figueirão	Pharmacy	Municipal Pharmacy	(67) 3274-1209	Av. Moisés de Araújo Galvão, 1595. Center
Figueirão	Laboratory	Municipal Laboratory	67) 3274-1209	Av. Moisés de Araújo Galvão, 1595. Center
Figueirão	Sanitary Enforcement	Sanitary Surveillance	(67) 3274-1209	Av. Moisés de Araújo Galvão, 1595. Center
Camapuã	Warehouse	Health Department's Warehouse	(67) 3286-4747	Rua Cuiabá, 66, Centro
Camapuã	Regulation	Municipal Regulation Center	(67) 3286-1088	Rua Pedro Celestino, 556, Centro
Camapuã	CAPS	Camapuã Psychosocial Care Center	(67) 3286-4735	Rua dos Jesuítas, 735, Centro
Camapuã	Clinic	Municipal Healthcare Clinic	(67) 3286-2456	Rua Cândido Severino, 616 Centro
Camapuã	Sanitary Enforcement	Sanitary Surveillance Directorate	(67) 3286-1077	Rua Antônio Inácio Barbosa, S/N, Diamantino
Camapuã	Laboratory	Laboratory Collection Center	No Information	Rua Cuiabá, 115, Centro (Fundos)
Camapuã	Emergency Ambulance Service	SAMU 192 - Camapuã	192	Rua Brasil, 327, Centro
Camapuã	Primary Healthcare Unit	Pontinha do Cocho Primary Healthcare Unit	(67) 3711-1027	Rua Joaquim Malaquias da Silva, s/n, Pontinha do Cocho
Camapuã	Primary Healthcare Unit	Family Healthcare Unit I - Bairro Alto	(67) 3286-2284	Rua Alvino Antônio Martins, s/n, Bairro Alto
Camapuã	Primary Healthcare Unit	Family Healthcare Unit II - Vila Izolina	(67) 3286-4586	Rua Beltino Ferreira De Lima, s/n, Joao Leite de Barros

Municipality	Type	Name	Telephone	Address
Camapuã	Primary Healthcare Unit	Family Healthcare Unit III - Central	(67) 3286-1090	Rua Cuiabá, 115, Centro
Camapuã	Primary Healthcare Unit	Family Healthcare Unit IV - Cristo Redentor	(67) 3286-5199	Rua Atanagides Alves da Rocha, s/n, Cristo Redentor
Camapuã	Primary Healthcare Unit	Family Healthcare Unit V - Vila Industrial	(67) 3286-3476	Rua Cuiabá, s/n, Vila Industrial
Camapuã	Primary Healthcare Unit	Family Healthcare Unit VI - Rural	(67) 3286-1090	Rua Cuiabá, 115, Centro (Fundos)
Camapuã	Pharmacy	Central Pharmacy	(67) 3286-1222	Rua Campo Grande, n/n, Centro (next to the Health Secretariat)
Camapuã	Hospital	Maternity Hospital and Child Protection Society Municipal Hospital	No information	Rua dos Jesuítas 594, Camapuã, MS, 79420-000
Costa Rica	Primary Healthcare Unit	Central Family Healthcare Unit	No information	RUA JOSINA GARCIA DE MELO - 1074, CEP: 79550000
Costa Rica	Primary Healthcare Unit	São Francisco Family Healthcare Unit	No information	LAURESTIDES MARTINS CARRIJO - 349, CEP: 79550000
Costa Rica	Primary Healthcare Unit	Sonho Meu Family Healthcare Unit III:	No information	GABRIEL RODRIGUES DA SILVA - 251, CEP: 79550000
Costa Rica	Primary Healthcare Unit	Rural Family Healthcare Unit	No information	RUA J - 171, CEP: 79550000
Costa Rica	Primary Healthcare Unit	Vila Nunes Family Healthcare Unit	No information	SEBASTIAO MESSIAS DE PAULA - 1020, CEP: 79550000
Costa Rica	Hospital	Fundacao Hospitalar de Costa Rica	No information	AVENIDA JOSE FERREIRA DA COSTA 2222

Source: Figueirão Municipal Administration, Camapuã Municipal Administration, and Healthcare Center Portal (2023).

7.3.1.7. Transportation

The interpretation of the number of vehicles, the road capacity of the municipalities, and the existing connections are crucial factors for analyzing potential impacts on local traffic. New undertakings are typically accompanied by changes in the flow of trucks, buses, and other vehicles on local roads, which can, to some extent, affect traffic and the movement of people in the considered areas of influence.

The municipalities in the AII benefit from good road coverage and are served by state highways. Camapuã is situated at the junction of MS-060 and MS-142 (state highways), heading in the northwestern direction of the municipality. In the eastbound direction, there is a junction of BR-060 federal highway and MS-422 state highway, connecting Camapuã to Figueirão. MS-060 provides access to MS-441 (both state highways), connecting to BR-163 federal highway in the municipality of Bandeirantes. Via the federal highway, it is possible to reach the capital, Campo Grande. The MS-142 state highway connects the municipality to the northwest of the state of Mato Grosso do Sul.

The municipality of Figueirão features junctions between the MS-422 and MS-436 state highways to the south of the urban center, as well as the MS-436 junction with the MS-223 state highway. In 2019, the state government of Mato Grosso do Sul paved 61 km of the MS-223 between Figueirão and Costa Rica, turning it into a road used for transporting production and reducing the distance to Campo Grande by 80 kilometers. The MS-436 state highway, situated northwest of Figueirão, connects the municipality with Alcinópolis.

Costa Rica is in the junction of the MS-223 state highway to the west, the MS-135 state highway to the north, and the MS-316 state highway to the northeast and southwest. The MS-316 interconnects Costa Rica with the municipality of Paraíso das Águas in the eastern region of the state of Mato Grosso do Sul, and the MS-359 state highway provides access to Alcinópolis.

Regarding the number of vehicles registered in the municipalities of the AII, as of December 2022, 27,932 vehicles were registered with the National Traffic Secretariat (SENATRAN). Cars predominate in the municipalities in the AII, constituting 39.5% of the total or 11,026 cars, followed by motorcycles, which account for 30.4% or 8,846 motorcycles in the territory. Pickup trucks make up 17.6%, totaling 4,923 vehicles, followed by trucks with 10.4% of the total, or 2,900 vehicles.

It is important to note the increase in vehicles in the municipalities of the AII between 2013 and 2022. Overall, there was a 58.6% increase in the number of vehicles in the three municipalities during the analyzed periods, with 17,611 vehicles registered in 2013 and 27,932 in 2022. The most significant differences between 2013 and 2022, based on vehicle types, show a 76.9% increase in vans, 75% in trucks, 67% in cars, 36.5% in motorcycles, and 16.6% in other vehicles. The number of SUVs rose from 26 to 72, which, despite representing a small number of vehicles, marked an increase of 193.6%.

Table 7-31 - Total vehicles by type. Camapuã, Costa Rica, and Figueirão (2013 and 2022).

Municipality	Year	Cars	Trucks	Pickup trucks	Buses	Motorcycles	Utility vehicles	Other	Total
Camapuã	2013	2,424	670	1,107	85	1,961	26	2	6,275
	2022	3,545	1,026	1,770	108	2,557	72	3	9,081
Costa Rica	2013	3,913	935	1,485	162	3,949	48	4	10,496
	2022	6,961	1,758	2,794	209	5,494	146	4	17,366
Figueirão	2013	258	53	191	26	307	5	0	840
	2022	520	116	359	41	435	14	0	1,485
Total	2013	6,595	1,658	2,783	273	6,217	79	6	17,611
	2022	11,026	2,900	4,923	358	8,486	232	7	27,932

Source: Adapted from SENATRAN (2023).

7.3.1.7.1. Air transport

The municipality of Costa Rica also has a local airport, but it does not operate commercial flights. The José Antônio de Moraes Municipal Airport is located on the MS-135 state highway, in a rural area of the municipality, approximately 7 kilometers from the city center of Costa Rica. The airport currently caters to private flights and can accommodate small planes.

The airport features an asphalt runway that is 1160 meters long and 23 meters wide. Although the airport does not currently handle commercial flights, there are plans for investment and a partnership between the city council and the state government to expand the airport's capacity and start receiving domestic flights[10].

[10] https://www.costarica.ms.gov.br/portal/noticias/0/3/4731/aeroporto-de-costa-rica-preparado-para-receber-voos-comerciais

Figure 7-36 - Costa Rica Municipal Airport



Source: Aeroin (2023).

7.3.1.8. Sanitation

With regard to sanitation, there is limited information available on the municipalities' portals, but basic sanitation in Mato Grosso do Sul is provided by Mato Grosso do Sul's water company (SANESUL). According to information on SANESUL's portal, the three municipalities are supplied by deep wells.

Camapuã's water supply relies on 12 deep wells, a 77.8 km pipe network, and a reservoir of 780.02 m³. The Camapuã system serves both the urban center and the district of Pontinha do Cocho.

Camapuã also has a Wastewater Treatment Plant (WWTP). Camapuã'S WWTP is located in the urban area of Camapuã, on Rua Benício de Moura (geographic coordinates UTM (21 K) 809,792 E / 7,837,827 S), 20 m from the receiving water. It is completely fenced off, with no vegetation inside and a tree curtain around it. The WWTP treated around 81.63% of the municipality's sewage in 2019[11].

In Figueirão, there are five water collection wells, covering 99% of the municipality's urban population. The general water supply network is 18.75 km long, and the reservoir has a capacity of 400.02 m³.

[11] http://www.agems.ms.gov.br/wp-content/uploads/2020/07/RAD-Camapua_2019.pdf

Figueirão's WWTP[12] is located in the municipality of Figueirão, close to the urban area and accessed via MS-223 state highway (geographic coordinates UTM (22 K) 220,835 E / 7,933,867 S), 480 m from the receiving water. It is completely fenced off with smooth wire fencing. The area is covered by pasture grasses and contains a few sparse trees.

In Costa Rica, 100% of residents in urban areas, totaling 3,102 inhabitants, are covered by the water supply. The following are some sanitation indicators available on the Water and Sanitation Institute's portal, which compiles information from various official bodies, such as the National Sanitation Information System - SNIS.

Table 7-32 - Sanitation indicators. Figueirão, Camapuã and Costa Rica (2022).

Information	Figueirão	Camapuã	Costa Rica
Population served with water	1,586	9,735	21,456
Percentage of population served with water	51.73%	71.19%	100%
Urban population served with water	1,586	9,735	18,354
Percentage of urban population served with water	99%	99%	100%
Rural population served with water	0	0	3,102
Percentage of rural population served with water	0%	0%	0.9997
Average per capita water consumption (l/inhabitants/day)	232.8	184.7	176.3
Average water tariff (BRL/m3)	5.89	5.72	3.79
Hydrometric index	100%	100%	1
Distribution loss index	24.55%	29.33%	9.48%

Source: Water and Sanitation Institute (2023).

Finally, concerning the municipal legal framework for sanitation, both Figueirão and Costa Rica have both a municipal sanitation policy and a municipal sanitation plan. Figueirão established its policy in 2017, while Costa Rica implemented theirs in 2013. Conversely, Camapuã has a municipal sanitation policy and is currently in the process of preparing a municipal sanitation plan.

Table 7-33 - Current status of the sanitation legal framework in the municipalities

Information	Figueirão	Camapuã	Costa Rica
Municipal sanitation policy	Yes	In progress	Yes
Legal instrument establishing the policy	Law	--	Law
Year the instrument was created	2017	--	2013
Municipal sanitation plan	Yes	In progress	Yes

Source: Water and Sanitation Institute (2023).

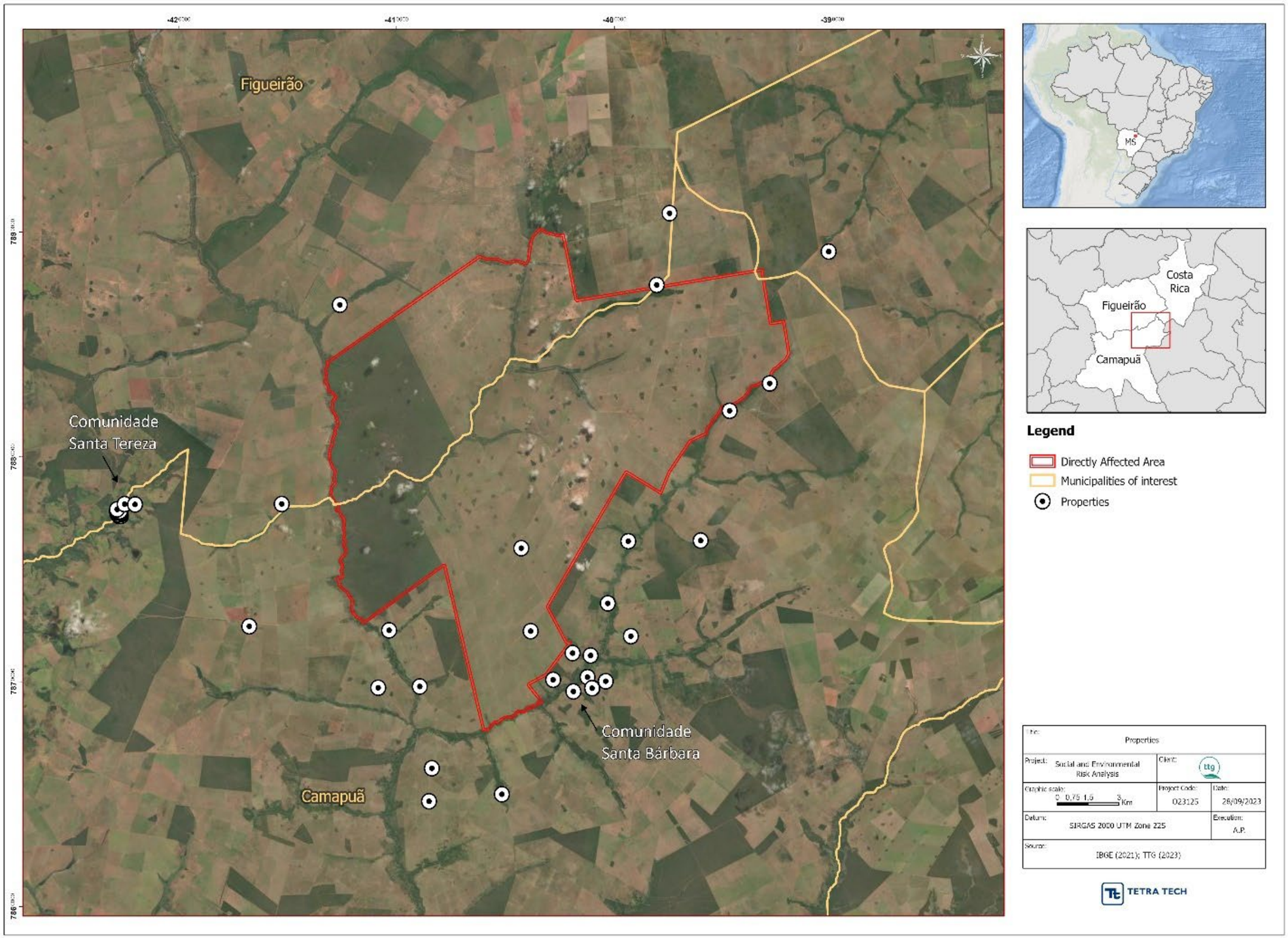
[12] http://www.epe.segov.ms.gov.br/wp-content/uploads/2020/01/29.-PMGIA-Figueir%C3%A3o.pdf

7.3.2. Area of Direct Influence

The characterization of the Area of Direct Influence (ADI) will involve gathering information about the residents around the project, including the Santa Barbara community, workers from Project Alpha engaged in livestock management and those involved in forest management. Additionally, the Santa Tereza quilombola community and the municipalities will be considered.

It is worth noting that urban centers have been classified as ADI, as it is understood that impacts can be identified in relation to the provision of services and public infrastructure. It should be highlighted that, although urban centers are considered ADI, the impacts in these areas will be of little magnitude. However, all the municipalities were also considered Areas of Indirect Influence (AII). Thus, the ADI will provide qualitative information on the potential impacts of the project on public services. In the AII, general aspects of the municipalities will be presented, including quantitative information from secondary data.

Figure 7-37- Location of the properties visited as part of the Socio-economic Environment diagnosis - Project Alpha.



7.3.2.1. Residents

In June 2023, the Social Progress Index (SPI) was drawn up at the request of the company. This index included a socio-economic survey of all households located within a 3-kilometer radius of Project Alpha, encompassing the municipalities of Camapuã, Costa Rica, and Figueirão. Additionally, the survey had a special focus on the traditional communities present in the areas of direct and indirect influence of Project Alpha, with emphasis on the Quilombola community of Santa Tereza in the municipality of Figueirão and the residents of the Santa Barbara community.

Out of the 44 families living in the mapped region, 39 were interviewed. Among these, 21 are located in the municipality of Figueirão, 17 in Camapuã, and one in Costa Rica.

Photo 7-1 - Residents near Project Alpha







The vast majority, 22 out of 39, are originally from the region, while 15 out of the 39 families were offered work and settled there. In terms of education levels, 14 interviewees have incomplete primary education, ten completed secondary education, five completed higher education, five have incomplete secondary education, and, finally, five were not literate. The family income of those interviewed goes hand in hand with the level of education: the higher the level of education, the higher the recorded income. According to the SPI (2023), people with higher education have a monthly family income of approximately BRL 10,600.00; those with complete secondary education earn around BRL 7,670.00; incomplete secondary education, BRL 4,640.00; incomplete primary education, BRL 4,204.17; and people who were not literate, BRL 2,200.00.

The families work mainly with rural activities. Among those interviewed, 16 are dedicated to milk production, and to supplement their income, they also work as day laborers on neighboring farms. Thirteen are salaried rural workers, two are day laborers, and the rest are dedicated to dairy and beef cattle breeding or rearing, as well as agricultural production.

According to the SPI (2023), only the Santa Tereza community has a weekly collection of household waste. The other families interviewed are not provided with garbage collection service, so they adopt other measures such as burying, burning, or taking the waste to urban centers. All the families have electricity supply. However, there is no water supply network in the region, so they consume water from community and private artesian wells and springs. Water from both sources is consumed without prior treatment.

The study compiled information on the Human Development Index (HDI) for the three municipalities of Camapuã, Costa Rica, and Figueirão. The HDI measures three indicators: life expectancy, education, and per capita income. The index is expressed as a value between 0 and 1. The higher is the HDI value, the higher is the human development in the region.

After consolidating the primary data, weights were assigned to the information collected based on dimensions, components, and pre-established indicators. This process resulted in scores ranging from 0 to 10. Consequently, the calculated SPI corresponds to 5.36, representing the average of indicators related to basic human needs (5.13), foundations of well-being (5.71), and opportunity (5.25).

Therefore, to facilitate comparison with the primary data collected, the HDI was multiplied by 10. Costa Rica stands out among the municipalities, having the highest average HDI, 7.06, followed by Camapuã with 7.03, and Figueirão with 6.60. The average value for the three municipalities is 6.90.

When comparing the average SPI value of the communities, which is 5.36, with the average HDI of the three municipalities, which is 6.90, it is evident that the rural region requires investments and actions to promote better living conditions and address issues related to basic human needs, the foundations of well-being, and opportunity. This is essential for increasing the Social Progress Index.

In addition to the information collected through the SPI, interviews were conducted with local residents to qualitatively assess how they perceive the changes in economic activity on Project Alpha.

During conversations with the Tetra Tech team, the neighboring residents expressed their anticipation for the project, believing it can bring economic development to the region and enhance the two existing public facilities: the public school and the health care center. Furthermore, residents expressed a hope for the improvement of the roads around the farm, which they currently consider to be of poor quality.

Residents say that the area is populated by friendly people, and they have a good relationship with the neighborhood. However, they express wariness toward the new workers arriving, as most of them are from outside the state, and many are single men or men without families. This situation creates some fears about potential harassment from these newcomers.

Regarding infrastructure, the majority mentioned dissatisfaction with the electricity supply, stating that power outages lasting for days are common. According to one neighbor, this issue has been a long-standing complaint. Additionally, some residents directly use water from springs inside Project Alpha, both for animal watering and personal use.

In terms of communication, there is no cell phone signal in the Area of Direct Influence region, except in urban centers. However, there is internet signal, and the primary way neighbors communicate and stay informed is through social networks. Few residents reported using television or satellite signals for telecommunications. It was mentioned that there is a WhatsApp group that includes both members of the neighborhood and employees of the company providing services in the social area, contracted by the company, which currently manages social communication. According to the neighbors, the group functions well and allows for quick interaction.

On the other hand, almost all neighbors expressed having little or no knowledge of the project, with sporadic conversations occurring with a social services provider hired by the company, who visits them frequently. While there is no discontent, residents emphasize the need for more dialogue with the company, as many doubts are arising among the surrounding residents.

7.3.2.2. Santa Barbara community and public facilities

The Santa Barbara community is not a rural locality in the conventional sense, characterized by an agglomeration of residents in an urban center. Instead, it is an organization of neighboring residents who have come together to facilitate the construction of a chapel, a space for events, and a small rural school and health care center. However, none of the interviewees were able to specify the exact number of people who are part of the community.

The school in the area operates as an extension of the Lucas Alves do Vale Municipal School, serving as a branch of the school in Camapuã. It is multigrade classroom, spanning seven grades, and currently has 18 students, two of whom have special needs. In a conversation with the school's teacher, it was mentioned that the school grounds are part of a farm, and the classroom is on loan. The school has a total of three employees: a teacher, a classroom assistant, and another person responsible for cleaning and preparing meals.

The teacher mentioned that there are social projects sponsored by the company through a service provider in the social area. This provider has presented theatrical performances about animals, dental healthcare, and environmental projects to the school, which have seen great student participation.

The health care center is located next to the school. The initial intention was for this healthcare center to receive doctors and dentists at least once a month, but no one has visited in the last six months. The space has since become the school's storeroom. When they are notified of a visit, they go there and clean it up.

Finally, residents typically gather at Santa Barbara’s church once a month. This is the time when neighbors exchange information about the region and discuss aspects related to the impacts they have been feeling in relation to the undertaking. According to the residents, it is possible to have meetings with the community where and when the mass takes place.

Photo 7-2 - Lucas Alves do Vale Municipal School



Source: Tetra Tech (2023).

Photo 7-3 – Healthcare Center - Santa Barbara



Source: Tetra Tech (2023).

Photo 7-4- Church and community space



Source: Tetra Tech (2023).

Photo 7-5 - Community space



Source: Tetra Tech (2023).

7.3.2.3. Santa Tereza Quilombola Community

The quilombola community of Santa Tereza is located in the municipality of Figueirão and is approximately 10 km from the boundaries of the Project Alpha. Access to the quilombola community is via the unpaved MS-442 highway, situated between Figueirão and the junction with the MS-436.

The town of Santa Tereza has been in existence since 1901, marked by the arrival of the Malaquias family from Minas Gerais, who settled in the region. Over time, other families migrated to the area, and by the 1950s, the village had a substantial number of residents. This growth led the local residents to elect Sabino Correa as a Camapuã city councilor in 1977.

Sabino Correa played a fundamental role in the community as, through him, the residents gained access to a public school (Benedito Alves do Bonfim School). This development attracted more residents since there were few public schools available in the region. Following the establishment of the school, a ten-hectare area was allocated and donated to families from Camapuã. With this settlement, Sabino Correa laid the foundation for the creation of the Santa Tereza community. This community received certification as a remaining quilombola community on July 4, 2005, by the Palmares Cultural Foundation.

Locally, the community is renowned for its religious festival in praise of the Divine Holy Spirit. This annual event attracts tourists from both Figueirão and Camapuã.

The community currently comprises around 22 families. At present, there are several collective facilities in the community, including a chapel, a space for holding events, a meeting room, and an administration office.

On August 22, 2023, an interview was conducted with a community leader who also serves as the vice-president and treasurer of the Santa Tereza community. During the interview, he provided relevant information about the community and its current situation.

With regard to education, the community leader mentioned that the community is home to a fully functioning public school. This school serves both children from the community itself and children from the surrounding area. He emphasized that, at present, he is the sole teacher working at the school and holds a degree in teaching.

Concerning the community's economy, he stated that the primary source of income is derived from the monthly sale of 16,000 liters of milk to dairy companies in the region. However, he highlighted that this income is considered insufficient, and there is a pressing need for more job opportunities for the residents. The scarcity of jobs has led to a recent exodus of residents from the community in search of better living conditions. Additionally, he pointed out that some community members express a desire to establish a small dairy processing industry, as it would provide greater added value to the products and, consequently, higher incomes for the residents. However, the community faces technical and financial challenges that make it difficult to realize this idea.

He notes that the Santa Tereza community has limited contact with Project Alpha, and currently, none of the community's residents work on the farm. The ten-kilometer distance between the community and the farm makes direct communication between the residents and the farm's employees challenging.

There is no cell phone coverage in the area, but internet services are available. The primary mode of communication for residents is the WhatsApp app. Additionally, there is no television signal in the area, and most residents obtain their information exclusively through social networks, as mentioned by the community leader.

The leader also reported that professionals from the social services company hired by the company have contacted the community and conducted sporadic meetings with its members. The Santa Tereza community welcomes the arrival of a new enterprise and believes it could generate more jobs and income, both for the community itself and the region in general. It is important to note that the community actively participates in communication programs and other social initiatives promoted by the company, including job and income generation projects.

The company, through its social service provider, is working in partnership with the Santa Tereza community to collect and acquire seeds from species native to the region. This initiative is part of an effort to prepare the community to join the Cerrado Native Seed Network, with the aim of replanting areas undergoing restoration processes. According to the community leader, training courses have already been conducted, and the community has initiated the collection, processing, and sale of seeds.

Photo 7-6 - Santa Tereza's community hall



Source: Tetra Tech (2023).

Photo 7-7 - Santa Tereza's chapel



Source: Tetra Tech (2023).

Photo 7-8- Santa Tereza's chapel and community space



Source: Tetra Tech (2023).

Photo 7-9- Santa Tereza's school and healthcare center



Source: Tetra Tech (2023).

Figure7-38- Festival in praise of the Divine Holy Spirit



Source: Figueirão 20 years magazine (2023).

Figure 7-39- Aerial view of the Santa Tereza community



Source: Figueirão 20 years magazine (2023).

7.3.2.4. Workers at Project Alpha

Two groups of workers were interviewed: those involved in livestock farming at Project Alpha and the newly hired personnel for forest management.

7.3.2.4.1. Livestock workers

All in all, Project Alpha currently employs six individuals responsible for handling all the cattle. During the fieldwork, interviews were conducted with four employees, including the farm's administrative manager, two general service foremen, and the general manager. The administrative manager has dedicated 39 years to Project Alpha, the general manager has been with the farm for 26 years, and the general service employees have served for 20 and 6 years, respectively. All of them possess work permits signed by their employer.

Out of the six employees, one lives on the farm with his wife, while the other four stay on the farm during working hours and return to their respective homes on weekends. Additionally, there is a worker who resides in Figueirão and commutes to the farm daily.

With regard to the activities carried out at Project Alpha in the period prior to the company's takeover, the workers mentioned that the property used to have 15 professionals, in addition to other sporadic professionals such as veterinary doctors, which allowed for better organization of the work.

The workers learned about the possible sale of the Project Alpha in 2019, but no additional information had been provided until they heard the news of the sale. The interviewed workers expressed optimism that the enterprise could bring improvements to the region, such as better roads, an improved school, and a better health care center. They also discussed the job opportunities that could arise for local residents and the region. The workers mentioned that the deadline for disposing of around 5,000 head of cattle was set for November, and the destination was the municipality of Miranda, in Mato Grosso do Sul.

However, the workers expressed dissatisfaction with the limited dialogue concerning the conclusion of activities that will occur after the cattle have been transported, either with the company or with the former owners of the property. Among the four interviewees, two expressed a desire to continue working at Project Alpha, while the other two conveyed an interest in leaving the region in search of new opportunities.

Photo 7-10- Interview with livestock workers



Source: Tetra Tech (2023).

7.3.2.4.2. Forestry workers

The forestry workers at Project Alpha are from an outsourced service provider. Currently, approximately 129 forestry workers are employed at Project Alpha. Among them, 69 are from Mato Grosso do Sul (53.5%), 34 from Maranhão (26.4%), 18 from Bahia (14%), three from Goiás (2.3%), four from Piauí (3.1%), and one from Sergipe. Their average salary is BRL1,923.55.

Table 7-34 - Forestry workers assigned to Project Alpha

State of origin	N	%
Bahia	18	14.0%
Goiás	3	2.3%
Maranhão	34	26.4%
Mato Grosso do Sul	69	53.5%
Piauí	4	3.1%
Sergipe	1	0.8%
Total	129	100.0%

Source: TIG (2023).

The workers who come from other cities and states are lodged in the municipalities of Costa Rica and Figueirão. Workers are required to adhere to the company's lodging policy, which outlines 17 rules of conduct and behavior. Simultaneously, the lodgings must also comply with internal regulations to provide services for the company, offering workers rights such as providing meals and maintaining the lodging's cleanliness.

It is worth noting that both workers and companies collaborating with the company are obligated to adhere to Work Instruction 004 or IST-004, focusing on the health and safety of rural workers. The IST (Occupational Safety Instruction) mandates compliance with the Ministry of Labor's Regulatory Standard - NR 31 - Occupational Safety and Health in Agriculture, Livestock, Forestry, Forest Exploration, and Aquaculture.

During the visit, 10 interviews were conducted with the workers. The positions of the interviewees included five forestry technicians, two drivers, a supervisor, an ant-fighting technician, and a welder. Most of the interviewees were from outside the Area of Direct Influence municipalities but were based in Costa Rica and Figueirão. The average length of work experience was five months.

In general, the interviewees expressed the belief that the venture could bring development to the region and offer better job opportunities for them. However, they also mentioned that the work was quite strenuous and complained about the distance between their lodgings and the farm, stating that they would prefer not to stay at the farm itself.

Among those interviewed in Costa Rica, there were complaints about the distance, as they had to leave at 5:00 a.m. to start work at 7:00 a.m., making for a very tiring journey. Additionally, workers expressed contentment with the lodging but voiced concerns about the seasoning in the meals and the local cuisine. They mentioned attempts to include typical northeastern recipes but encountered challenges and are still adapting to the local cuisine.

It's worth noting that the company follows internal regulations on employee meals. IST001 Food stipulates that meals are prepared in advance by nutritionists and served to workers for breakfast, lunch, and dinner. Moreover, the lodging manager in Figueirão mentioned that workers are free to eat elsewhere and can also use the kitchen to prepare special meals during their time off, especially on weekends and holidays.

Among the workers staying in Figueirão, two individuals complained about the lodging, stating that it was not cleaned regularly, and they found the relationship with the manager to be stressful and sometimes problematic. Additionally, interviewees expressed dissatisfaction with the meals and reported issues with a bus that had no windows and air conditioning not working correctly.

Photo 7-11 - Interview with forestry workers



Source: Tetra Tech (2023).

8. POTENTIAL ENVIRONMENTAL, SOCIAL, HEALTH, AND SAFETY IMPACTS

8.1. ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

The Environmental Impact Assessment (EIA) requirement is established in legislation (Federal Law No. 6.938/1981). It constitutes the procedures that aim to identify, interpret, and evaluate the environmental and social effects of a project's activities and actions to subsidize the analysis appropriately for licensing agencies, the public, and those responsible for decision-making. Within the scope of the International Finance Corporation (IFC), the assessment of environmental impacts is in line with Performance Standard 1 'Assessment and Management of Environmental and Social Risks and Impacts.'

The methodology used to identify and evaluate the potential environmental impacts (both positive and negative) related to the implementation and operation of Project Alpha took the identification of impacts as a starting point. This was prepared by the multidisciplinary team responsible for this document, based on the available data for diagnosing the main factors of the biotic, physical, and socio-economic environments.

It should be noted that the impacts were considered as changes that could be observed, taking into account the routine environmental processes and aspects associated with the implementation and operation of Project Alpha. Chapter 9 identifies the risks, which are related to possible accidents, malfunctions, or unforeseen activities.

It is important to note that specific impacts have varying relationships with the territory where they operate. In other words, they do not occur to the same extent or size of the area when they happen in two or more phases. With these considerations, it can be predicted that the impacts may have different incidences, depending on the implications of each step of the project. The implementation, operation, and phaseout phases have been clearly defined.

The classification of these impacts was carried out considering a series of attributes that will be presented ahead. Additionally, for each identified impact, control measures were proposed, aiming to create strategies for avoidance, control, mitigation, enhancement, or compensation.

Following the identification of potential environmental impacts, the subsequent methodological procedure involves determining the attributes that will be evaluated. The definitions were based on Sánchez (*op. cit.*).

Regarding the identification, classification, and evaluation of the environmental impacts of the enterprise, a classification methodology was established using qualitative valuation criteria (based on SANCHEZ, 2012). In this methodology, the technical team, equipped with field information, assigns a degree of importance to the listed impacts. This analysis, in turn, supports the determination of environmental measures associated with the identified impacts.

The identification variables are characterized below.

Nature:

- **Positive/Beneficial (-):** Results in positive effects on socio-environmental factors, acting to improve environmental and social quality.
- **Negative/Adverse (-)**: Results in negative effects on socio-environmental factors, causing environmental or social damage.

Incidence:

- **Direct (-)**: Results from a direct relationship of cause (action generating impact) and effect (environmental impact). Also called 1st order impact.
- **Indirect (-)**: Results from a secondary reaction to the intervention or when they are part of a chain of reactions, i.e., 2nd or 3rd order impacts.

Duration:

- **Temporary**: Manifests during one or more phases of the enterprise and ceases upon deactivation of the generating action.
- **Permanent**: Represents the definitive alteration of the environment. That is, once the intervention is carried out, the effects do not cease to manifest.
- **Cyclical**: Represents changes normally related to activities that occur intermittently, stopping at the end of the cycle.

Temporality:

- **Short-Term**: Manifests at the time or immediately after the occurrence of the intervention generating the impact;
- **Medium-Term:** Manifests a few months after the action generating the impact.

- **Long-Term:** Manifests years after the intervention generating the impact.

Territorial Reach:

- **Restricted:** Change is restricted to the limits of the areas of intervention of the activity (DAA).
- **Local**: Change is related to the limits of the Area of Direct Influence (ADI).
- **Regional:** Change is related to the limits of the Area of Indirect Influence (AII) or goes beyond the limits of the AII.

Occurrence Probability:

- **Certain:** When there is no uncertainty about the occurrence of the impact.
- **Likely:** When, based on similar cases and the observation of similar projects, it is estimated that the impact is likely to occur, but its occurrence cannot be ruled out.

Reversibility:

- **Reversible:** Those in which the affected environment returns to the original or similar conditions once the action generating the impact has ceased or corrective action has been implemented.
- **Irreversible:** Those in which the affected environment does not return to the original or similar conditions, even when the action generating the impact ceases or corrective action is implemented.

Accumulation and Synergism:

- **Non-Cumulative and Non-Synergic Impact:** There is no integration with the effects of other impacts, either by the simple sum (cumulative) or by the potentiating sum (synergistic).
- **Cumulative and Non-Synergic Impact:** The effect of the impact is cumulative to the effect(s) of other impact(s) in the same environmental system, with no potentiating effect.
- **Cumulative and Synergistic Impact:** The effect of the impact analyzed together with other impacts presents environmental changes that go beyond the simple sum of each impact, and may, in addition to enhancing the effects, change new environmental parameters.

Magnitude:

Magnitude measures the relevance of the impact given the environmental characteristics of the affected area. This attribute, in the methodology used, considers the magnitude of an impact in absolute terms and can be defined as the measure of change of an environmental attribute, in quantitative or qualitative terms, adopting a nominal scale:

- **Low:** The impact is not perceived or verifiable.
- **Average:** Change is verifiable and/or capable of being measured, without, however, characterizing gains or losses in the environmental quality of the area of coverage considered.
- **High**: Change is verifiable and/or can be measured, characterizing gains and/or losses in the environmental quality of the area of coverage considered.

Whenever possible, the evaluation of the magnitude of an impact will be carried out according to a non-subjective criterion, allowing for a quantitative classification and, therefore, more precision. However, it is observed that most of the expected potential impacts cannot be measured quantitatively, making it difficult to draw comparisons.

8.2. ENVIRONMENTAL IMPACT ASSESSMENT

8.2.1. Implementation Phase

8.2.1.1. Physical Environment

8.2.1.1.1. Changes in Surface and Groundwater Quality

The implementation of reforestation and forestry areas involves the movement of vehicles, machinery, and earthmoving operations for the opening of main and secondary roads, as well as firebreaks. Additionally, there are plans to delineate the stands where eucalyptus plantations will be established. These activities can initiate erosive processes combined with the flow of sediments to watercourses, potentially causing changes in water parameters.

Furthermore, it is known that there are ten degraded and/or modified areas from the past, during the period when the farm was under the management of the former owner. These areas are located along the watercourses and in the springs, as identified in the Environmental Diagnosis. As seen in the Diagnosis, the company has implemented a Degraded Area Recovery Plan (PRADA) related to these areas.

Additionally, and of greater relevance, is the use of chemical products practiced in forestry, such as glyphosate, sulfluramid, among other agrochemicals used in pest control, including direct application to the soil to combat ants. The use of agrochemicals can have potential impacts on the quality of groundwater and surface water, leading to water contamination by agrochemical residues. This contamination poses risks to human health and aquatic life, as well as impacting aquatic biodiversity. Moreover, contamination can result in long-term chronic effects on the aquatic ecosystem. Therefore, sustainable practices carried out through the monitored use of these chemicals by the company, in compliance with strict regulations, are crucial to minimizing these impacts and protecting water resources.

Thus, the impact due to alteration in the quality of surface and groundwater can be considered of **negative** nature, of **indirect** incidence, and **permanent** duration. Since, after triggering, the effect does not cease with the interruption of the generating activity, it has a **short-term** and **likely** occurrence, appearing right at the beginning of the implementation the forest activity. Its scope is **regional**, as it may exceed the limits of the Area of Direct Influence (ADI) and is **irreversible**; remediation measures may be necessary for the impact to cease.

Considering the other farms in the region, this impact can be considered **cumulative and synergistic**, potentially triggering new impacts. The magnitude of this impact is considered **high** due to its reach and the importance of the theme. From the application of mitigation measures, the impact has an **average** magnitude.

Table 8-1– Impact Classification "Change in Surface and Groundwater Quality"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Indirect	Indirect
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long-term)	Short	Short
Reach (restricted, local, regional)	Regional	Regional
Probability	Likely	Likely
Reversibility	Irreversible	Irreversible
Accumulation and Synergism:	Cumulative and Synergistic	Cumulative and Synergistic
Magnitude	High	Average

Mitigation measures and control actions are provided for in the company's environmental programs mentioned bellow, such as:

- Solid waste management with guidelines for handling, storage, and final disposal of waste generated as well as packaging.
- Septic tank system - sink filter.
- Installation of containment basin for oily effluents and oil-water separator box.
- Provision of environmental emergency kits in strategic locations.
- Implementation of Altered and/or Degraded Area Recovery Plan and Maintenance of roads, access pathways, and firebreaks.
- Maintenance of the areas housing fuel containers.

The company has been monitoring water quality at Project Alpha since 2022, and its actions are incorporated into the **Surface and Groundwater Qualitative and Quantitative Monitoring Program** proposed in this study. Additionally, solid waste management and the handling of chemicals are carried out, with the actions listed and incorporated into the **Solid Waste and Chemicals Management Program** of this environmental study.

8.2.1.1.2. Changes in Water Availability

The change in water availability is influenced by various factors, including the high consumption of water in large-scale monocultures (any monoculture), especially in arid climates (which is not the case at Project Alpha). There is no established definition in literature for the consumption of water drained from the soil in eucalyptus monocultures.

In managing Project Alpha, the company has implemented sustainable forestry practices that involve the use of guidelines and procedures established in work instructions. This focuses on minimizing water waste and continuously monitoring possible impacts on water sources.

The implementation of forest stands by the company takes into account the abstraction of water for irrigation at specific times and periods during the development of eucalyptus plantations. The abstraction of water from bodies of water occurs after the declaration of water resources use is granted by the environmental agency of the state of Mato Grosso do Sul - IMASUL.

The collection of surface water by water trucks to irrigate eucalyptus seedlings follows procedures. Firstly, the need for a license or waiver for the activity is verified, in accordance with current legislation. At the collection site, controls are carried out to record the quantities of water collected and used. This data is then sent to IMASUL (Instituto de Meio Ambiente do Mato Grosso do Sul), especially during the implementation and development phase of the forest stands.

Therefore, Changes in Water Availability is a potential impact of **negative** nature. It has a **direct** impact, considering the abstraction of surface water, with a **short-term** effect and **temporary** and **reversible** duration, ceasing with the closure of activities. The territorial reach can be considered **local**, without exceeding the ADI, and is of **likely** occurrence, classified as **cumulative and not synergistic**. For all the characteristics described, the magnitude of the impact is classified as **average**. After the application of mitigation measures, the impact has **low** magnitude.

Table 8-2 – Impact Classification "Changes in Water Availability"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Direct	Direct
Duration (cyclical, permanent, temporary)	Temporary	Temporary
Temporality (short, medium or long-term)	Short	Short
Reach (restricted, local, regional)	Local	Local
Probability	Likely	Likely
Reversibility	Reversible	Reversible
Accumulation and Synergism:	Non-Synergic Cumulative	Non-Synergic Cumulative
Magnitude	Average	Low

In order to minimize the possible impacts identified on water availability, the company, in the management of Project Alpha, plans to implement the following measures:

- Water abstraction from water bodies for irrigation after authorization and approval by the competent environmental agency.
- Constant monitoring of the possible impacts of the farm's activities on water resources through measures already implemented and measures proposed by this environmental study.
- Degraded Area Recovery Plan (PRADA): the company has a PRADA related to areas that have been degraded or altered in the past, especially in places close to watercourses and springs. This plan aims to restore these areas, contributing to the conservation of aquatic ecosystems.

In addition to the above measures, other mitigating and control measures, as well as guidelines for managing the issue, are reported in the the company's Work Instructions, incorporated into the **Surface and Groundwater Qualitative and Quantitative Monitoring Program**, presented in Chapter 12 of this environmental study.

8.2.1.1.3. Changes in Surface Dynamics

In areas designated for the restoration of degraded land and the establishment of eucalyptus plantations at Project Alpha, potential impacts are primarily associated with activities such as road, access, and firebreak construction, involving earthmoving that alters the original topography.

The opening of roads will necessitate topographic regularization and compaction, potentially modifying the flow of surface water runoff. Furthermore, the implementation of monocultures involves clearing grasses and managing soil. Project Alpha features gently undulating terrain with a moderate slope, primarily consisting of sandy soils that are susceptible to sediment transport when exposed vegetation does not provide adequate protection.

The erosion processes and undesired flow of water and sediment in the area intensify during the rainy season—a period in which the project's control measures should be intensified during the implementation.

It can be seen that the company has identified 10 environmental liabilities at Project Alpha that were previously degraded or altered while the land was under cattle ranching management by the former owner. These liabilities encompass areas of exposed soil in springs and watercourses Permanent Preservation Areas (APPs), rendering them susceptible to sediment transportation and the silting up of rivers and streams. The company has established and is currently implementing a Degraded Areas Recovery Plan (PRADA) aimed at restoring these impacted areas.

Thus, Changes in Surface Dynamics is an impact of **negative** nature, which has an **indirect** impact, resulting from activities on the terrain and soil compaction. It is **short-term**, as the changes may begin to appear shortly after the interventions, and has **temporary** duration, being triggered mainly in the implementation phase, until mitigation measures are taken. The territorial scope can be considered **local**, without exceeding the **ADI**, and **reversible**, since the impact will cease with the implementation of control/mitigation measures. This impact is of **certain** occurrence, since it already occurs even without the implantation of eucalyptus stands, classified as **cumulative and not synergistic** – since in the region other erosive spots are observed, but without triggering new impacts. If left untreated, its magnitude is considered **high** for all the characteristics described. However, this impact can be monitored, mitigated and controlled, and its magnitude will be considered **low**, considering the success of PRADA measures planned for the area, among other actions.

Table 8-3 – Impact Classification "Changes in Surface Dynamics"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Indirect	Indirect
Duration (cyclical, permanent, temporary)	Temporary	Temporary
Temporality (short, medium or long-term)	Short	Short
Reach (restricted, local, regional)	Local	Local
Probability	Certain	Certain
Reversibility	Reversible	Reversible
Accumulation and Synergism:	Non-Synergic Cumulative	Non-Synergic Cumulative
Magnitude	High	Low

To minimize the potential impacts associated with changes in surface dynamics at Project Alpha, primarily induced by road construction and the implementation of eucalyptus plantations and firebreaks, the company has outlined various measures, all detailed in the work instructions, including:

- Sustainable Soil Management: Implementing practices that minimize soil compaction and preserve the original topography, incorporating soil conservation techniques like contour lines.
- Sustainable Roads: Planning and building roads with a focus on preserving natural watercourses and minimizing the impact on surface water runoff. This can include the use of containment basins, adequate drainage, and environmentally friendly road engineering techniques.
- Revegetation: Implementing revegetation measures in impacted areas, using native vegetation or suitable species to stabilize the soil and reduce sediment transport.
- Erosion Control: Adopting erosion control practices, such as the construction of physical barriers and sediment containment structures, to prevent the discharge of sediment into watercourses.
- Regular Monitoring: Establishing continuous monitoring programs to track soil conditions, water runoff, and water quality. This ensures early detection of issues, enabling prompt corrective measures.
- Degraded Area Recovery Plan (PRADA): Enhancing the implementation of the existing PRADA for degraded areas, ensuring the proper restoration of these areas.

These measures aim to minimize the potential negative impacts identified, ensuring the preservation of the land in geometric conformity and reducing sediment transport to water bodies. In addition to the listed measures, the **Erosion Control and Monitoring Program** describes other management measures and monitors the effectiveness of these actions

8.2.1.2. Biotic Environment

8.2.1.2.1. Contamination of Natural Vegetation Areas due the Use of Chemicals

As discussed on the impact ‘Changes in Surface and Groundwater Quality,' the implementation of silviculture areas involves the use of certain chemicals, whether for ant control or grass management.

The application of chemicals and agrochemicals can result in significant environmental impacts, particularly in terms of water resource contamination, affecting rivers, streams, and groundwater. This has the potential to harm water quality and negatively impact aquatic life. Moreover, inappropriate use of these substances may compromise soil quality and fertility, creating unfavorable conditions for tree and plant growth. In the context of native flora, exposure to agrochemicals can lead to the mortality of non-target organisms and contribute to biodiversity loss. At Project Alpha, the company utilizes agrochemicals through sustainable practices and rigorous management, aiming to minimize and mitigate these potential impacts.

Thus, the impact can be considered of **negative** nature with **indirect** incidence and **permanent** duration—persisting even after the cessation of the generating activity. It is of **long-term** and **probable** occurrence, of **regional** scope, which may exceed the limits of the ADI, and **irreversible**, requiring remedial measures may be necessary for the impact to cease. Considering other farms in the region, this impact is **cumulative and synergistic**, possibly triggering further impacts. The magnitude of this impact is considered **average** due to its scope and the importance of the theme. With the application of mitigation measures, the impact has **low** magnitude.

Table 8-4 – Impact Classification "Contamination of Natural Vegetation Areas due to the use of Chemicals"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Indirect	Indirect
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long-term)	Long	Long
Reach (restricted, local, regional)	Regional	Regional
Probability	Likely	Likely
Reversibility	Irreversible	Irreversible

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Accumulation and Synergism:	Cumulative and Synergistic	Cumulative and Synergistic
Magnitude	Average	Low

Mitigation measures and control actions are included in the environmental programs implemented by the company at Project Alpha. These measures encompass:

- Sustainable guidelines and procedures for the handling, storage, and final disposal of chemicals and agrochemicals.
- Management of solid waste, including guidelines for handling, storage, and final disposal of generated waste and packaging.
- Installation of a septic tank system with a sink filter.
- Installation of a containment basin for oily effluents and an oil-water separator box in the machine maintenance area, alongside the creation of covered and paved areas for parking.
- Placement of environmental emergency kits at strategic locations on the construction site and work fronts.
- Implementation of Altered and/or Degraded Area Recovery Plan and Maintenance of roads, access pathways, and firebreaks.
- Maintenance of the areas housing fuel containers.

In addition, it is important to note that the company has been monitoring the quality of surface and groundwater at Project Alpha since 2022, following the protocols established in the Surface and Groundwater Qualitative and Quantitative Monitoring Program. The company also implements measures for proper waste management and the correct chemical handling, in accordance with the guidelines for **Solid Waste and Chemicals Management**.

8.2.1.2.2. Disturbance and Wildlife Removal

The implementation of reforestation and forestry areas involves the movement of people, vehicles, and machinery, causing a momentary change in noise. Additionally, for planting, the existing grass removal is also anticipated, as it can compete with the seedlings. Even if anthropized, these grassy areas can serve as shelter for some bird species, rodents, and snakes. Consequently, the animals will be displaced to adjacent areas capable of providing food, shelter, and similar conditions for rest and reproduction.

The impact 'Disturbance and Wildlife Removal' is considered of **negative** nature, with both **direct** incidence (associated with the process of cleaning areas) and **indirect** incidence (considering the impact of increased noise levels). The impact is deemed **permanent**, lasting throughout the implementation phase, and of **short-term**, becoming evident as soon as the implementation begins. It is of **certain** likelihood but **reversible**, as the impact concludes with the cessation of noise-generating activities. Its territorial reach is **local**, affecting both the Directly Affected Area (DAA) and the Area of Direct Influence (ADI). The impact is considered **cumulative and not synergistic**. With the application of mitigation measures, the impact is of **average** magnitude.

Table 8-5 – Impact Classification "Disturbance and Wildlife Removal – implementation phase"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Direct and Indirect	Direct and Indirect
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long-term)	Short	Short
Reach (restricted, local, regional)	Local	Local
Probability	Certain	Certain
Reversibility	Reversible	Reversible
Accumulation and Synergism:	Cumulative	Cumulative
Magnitude	High	Average

The company is implementing a range of measures aimed at minimizing the potential impacts identified during the implementation of reforestation and silviculture areas at Project Alpha:

- Team Training: The team involved in the area cleaning operations is receiving specialized training to ensure that the process is conducted in a controlled and effective manner, taking environmental concerns into account.
- Environmental Restoration: After implementation, efforts are being made to restore adjacent areas, creating alternative environments for the affected terrestrial fauna, offering food resources, shelter and conditions for resting and reproduction.
- Periodic Maintenance of Machinery and Vehicles: the company requires all service companies to check all machinery, equipment, and vehicles every three months for mechanical condition, smoke emissions, and noise levels.

In order to mitigate this impact, it is also important to adopt some environmental actions and apply an environmental program:

- Grass cleaning actions must be directed by a specialized team to prevent island formation, ensuring that the staff responsible for cleaning the area does not trap the wildlife. Therefore, the actions must be carried out in such a way that the fauna has routes to disperse.
- Implementation of the **Wildlife Removal and Possible Rescue Program**.

8.2.1.2.3. Loss of wildlife individuals due to stress, run-over and hunting events

During the implementation of activities at Project Alpha, due to increased noise levels, increased human movement, and the cleaning of the area, the fauna will be disturbed and relocated to adjacent areas. Individuals go through a stressful situation that, for some, can lead to death. Others, during the escape process, may end up being run over in the surrounding access roads. Finally, this escape process makes individuals more susceptible to hunting. Regarding hunting, it is important to highlight that hunted species were identified for all groups of terrestrial wildlife. This impact is linked to Performance Standard 6 'Biodiversity Conservation and Sustainable Management of Living Natural Resources.'

The impact of the loss of fauna individuals due to events such as stress, run-over, and hunting is considered of **negative** nature and **indirect** incidence, arising from the impact category 'Disturbance and Wildlife Removal.' The impact is deemed **permanent**, as it will persist throughout the implementation phase, and is considered to be **short-term**, manifesting as soon as the implementation begins. It is **likely** to occur and **irreversible**. It is important to highlight that the impact was classified as irreversible considering the individuals who will be lost, without taking into account the wildlife as a whole.

Its territorial reach is **local** as it affects both the DAA and the ADI. It is important to note that the implementation of Project Alpha also includes the removal of cattle that, until then, were raised in the area. Thus, there is a considerable contribution of trucks transiting the roads, which can increase the possibility of wildlife being run over. This area is not verifiable, as cattle are being transported to different regions of Brazil. Nevertheless, it is crucial for drivers to be trained on the importance of wildlife and to follow traffic laws.

It is considered a **cumulative and synergistic** impact linked to the 'Disturbance and Animal Eviction' impact. With the application of mitigation measures, the impact has **low** magnitude

Table 8-6 – Impact Classification "Loss of fauna individuals due to stress, run-over and hunting events – implementation phase"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Indirect	Indirect
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long-term)	Short	Short
Reach (restricted, local, regional)	Local	Local
Probability	Likely	Likely
Reversibility	Irreversible	Irreversible
Accumulation and Synergism:	Cumulative and Synergistic	Cumulative and Synergistic
Magnitude	Average	Low

The company is implementing a range of measures aimed at minimizing the potential impacts identified during the implementation of activities at Project Alpha:

- Team Education and Training: The team involved in the implementation operations receives specialized training to deal with wildlife, minimizing the occurrence of trampling and hunting in the area.
- Signposting and Traffic Control: Traffic control strategies, such as signposting sensitive areas and imposing speed limits on roads, are implemented to prevent wildlife from being hit by vehicles.
- Periodic Maintenance of Machinery and Vehicles: the company requires all service companies to check all machinery, equipment, and vehicles every three months for mechanical condition, smoke emissions, and noise levels.

To mitigate this impact, it is also recommended that the following actions are applied, as well as one environmental program:

- Temporary signs are installed at the access roads to alert about the possibility of wildlife.
- Environmental education and awareness initiatives must be implemented.
- Drivers must undergo training on the importance of wildlife as well as on traffic rules.
- Cleaning area actions must be directed by a specialized team to prevent island formation, ensuring that the staff responsible for cleaning the area does not trap the wildlife.
- Implementation of the **Fauna Rescue and Fleeing Program**.

8.2.1.2.4. Loss of ichthyofauna individuals due to changes in water quality and quantity in watercourse beds

Grass cleaning in reforestation and forestry planting areas will temporarily expose the soil. The exposed soil becomes susceptible to movement and can be carried into watercourses, causing changes in water quality. These changes are particularly observed with increased turbidity and electrical conductivity, decreased transparency; they may also cause changes in pH, decreased concentrations of dissolved oxygen, and increased concentrations of organic elements (phosphorus and nitrogen). Additionally, when deposited at the bottom of the watercourses, this soil causes changes in the conformation of the bed, affecting areas used for feeding and egg deposition.

The impact of the loss of ichthyofauna individuals due to changes in water quality and in the watercourse bed is considered of **negative** nature, **indirect** incidence (arising from the impacts 'Change in Water Quality' and 'Change in Surface Dynamics'). The impact is considered **permanent**, as it will last throughout the implementation phase and is considered of **medium-term** since it does not manifest itself right at the beginning of implementation. It is **likely** to occur and **reversible**, as it is understood that the watercourses will have the capacity to purify and return to their original state.

Its territorial reach is **restricted**, as it will affect only the portions of watercourses in the DAA. It is not considered a cumulative or synergistic impact. With the application of mitigation measures, the impact has **low** magnitude.

Table 8-7 – Impact Classification "Loss of ichthyofauna individuals due to changes in water quality and quantity in watercourse beds – implementation phase"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Indirect	Indirect
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long term)	Medium	Medium
Reach (restricted, local, regional)	Restricted	Restricted
Probability	Likely	Likely
Reversibility	Irreversible	Irreversible
Accumulation and Synergism:	No	No
Magnitude	Average	Low

The following are actions already carried out by the company to mitigate this impact:

- Sustainable Management Practices: Sustainable management practices, such as the use of agricultural techniques that reduce soil exposure and minimize the transfer of sediment to watercourses.
- Environmental monitoring: Regular environmental monitoring is conducted to track water quality, including turbidity, electrical conductivity, transparency, pH, dissolved oxygen concentrations, and concentrations of organic elements in the watercourses. This helps identify changes and enables corrective action when necessary.
- Protection of Sensitive Areas: Identification and protection of sensitive areas.
- Environmental Education: Raising awareness and training employees and workers on the importance of preserving water resources and ichthyofauna, as well as on appropriate practices to avoid negative impacts.
- Compliance with Regulations: Ensuring adherence to all environmental regulations and obtaining the necessary licenses for activities on the Project Alpha.
- Periodic Impact Assessments: Conducting periodic assessments to ensure the effectiveness of measures and adjusting mitigation strategies as necessary.

To mitigate this impact, it is also recommended that the following actions be applied, along with two environmental programs:

- Marking and delimitation of cleaning areas to prevent Permanent Preservation Areas from being affected.
- Implementation of the **Environmental Management Program**.
- **Qualitative and Quantitative Water Quality Program**.

8.2.1.3. Socio-economic Environment

8.2.1.3.1. Raising expectations in the communities

The arrival of a new project in the region has raised expectations among the stakeholders consulted, especially concerning the influx of new workers, changes in the landscape, and the impacts resulting from the planting of eucalyptus.

This impact is common to practically all new ventures, as the arrival of a new business has the potential to alter the local reality to some extent and, consequently, generate expectations in the population within the respective areas of influence.

In the case of changing the area from pasture to reforestation, there will be not only changes in the landscape of Project Alpha but also in the relationship with land use.

In a conversation with the deputy mayor of the municipality of Figueirão, although they are very excited about the new economic activity beginning at Project Alpha, there are still doubts regarding details of the project, such as the number of workers, the schedule for planting and harvesting eucalyptus, and how this may affect the municipality of Figueirão.

Additionally, residents around the farm, who were consulted, also expressed their anticipation for the project's arrival. However, there are a number of questions reported by the community:

- Possible job openings.
- Arrival of new people in the region, either to work or to reside on existing properties. According to the former leader of the Santa Barbara community, the region is populated by neighbors who have known each other for many years, and they fear that the outsiders may disturb the local residents.
- Change in economic activity can lead to changes in the flow of vehicles accessing the roads.
- More information about the activities, as there is no understanding of the potential positive and negative impacts on the part of residents.

The Santa Tereza community also expressed uncertainty. According to the community leader, there is great positive expectation regarding partnerships already being carried out between the company and the community. However, few meetings were held to inform about the potential impacts of the project. Besides, the community leader reported that there is a fear that workers at Project Alpha may, to some extent, harass community residents, especially during weekends and traditional festivals held in the community.

The workers who are being removed from the activities also had expectations regarding the future of the activities they perform. According to them, there has been no dialogue yet about the permanence or dismissal from the property, causing anxiety about their professional future. In this sense, while some workers have already chosen not to continue working on the farm, others hope to remain. However, according to them, there have still been no talks with the company about their professional future in the region.

The manager of one of the hotels that hosts project workers in the city of Figueirão reported that the residents of the municipality also have expectations regarding the project, mainly because new workers from other states are arriving, which has been causing doubts among the city's residents. However, the behavior of the workers has been praised, and no problems have been reported between the city's native residents and migrant workers.

The representatives of the municipality, including the deputy mayor, the Agribusiness Coordinator, the Executive Advisor, and the Development Coordinator, along with the representatives of the six secretariats active in the territory, pointed out that they recognize various positive aspects arising from the enterprises and companies that have set up in the municipality. This includes the generation of jobs and income, local development, and the possibility of social projects resulting from partnerships.

The company conducted a social survey to assess the potential impacts on the Area of Indirect Influence and concluded that the degree of impact is of little significance. This is due to the fact that the number of outsourced employees housed in Figueirão, approximately 120 employees, represents around 3% of the local population, which totaled 3,539 inhabitants in 2022.

In the survey conducted by the company, regarding potential social impacts, it is important to note that the work undertaken in the planting and maintenance phases is temporary and not permanent, in accordance with the forestry planning. Employees hired by service-providing companies, coming from other cities and states, travel to the municipality of Figueirão and utilize only the accommodations provided by the contracting company. No families stay there; only the employees use the facilities. These workers must adhere to the company's housing policy, which outlines guidelines for conduct and behavior. Additionally, in order to provide services to the company, the outsourced companies utilizing the lodgings need to adhere to internal regulations based on compliance with labor regulations, ensuring workers' conditions such as regular cleaning of the lodgings and the provision of meals.

In a way, the expectations that have been created do not aim to discredit or disqualify the enterprise. Generally, the eucalyptus plantation at Project Alpha is well-received by all stakeholders consulted; however, the impact gains relevance due to the limited dialogue between the company and the stakeholders. This communication aims to clarify the main aspects of the project and maintain a dialogue channel.

It is worth mentioning that there is no telephone signal in the region, and only a few people have access to satellite TV. As a result, communication among stakeholders, especially the neighbors around the farm, occurs primarily through apps and social networks. Consequently, there are limited means to access the company's service channels, such as the 0800 number.

The potential impact in this case can be classified as **negative** and **direct**. If no mitigation measures are adopted, it may become **permanent** and even adversely affect opinions regarding the enterprise and the entrepreneur. If measures are implemented, the impact will remain **temporary**, **short-term**, **local**, and **certain** (it is already noted by various stakeholders), but it is **reversible**. Without mitigation measures, it is considered of **high** magnitude, given its impact on the ADI population. With the application of mitigation measures, it is considered of **average** magnitude, as it can be mitigated to prevent further consequences.

Table 8-8- Impact Classification "Raising expectations in the communities"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Direct	Direct
Duration (cyclical, permanent, temporary)	Permanent	Temporary
Temporality (short, medium or long term)	Short-Term	Short-Term
Reach (restricted, local, regional)	Local	Local
Probability	Certain	Certain
Reversibility	Reversible	Reversible
Accumulation and Synergism:	Cumulative	Cumulative
Magnitude	High	Average

The company monitors the indicators of the Social Progress Index (SPI) and implements measures to address the expectations and concerns of stakeholders, aiming to minimize the possible impacts identified in the Project Alpha region.

- Continuous Dialogue with the Community: the company recognizes the importance of maintaining a continuous dialogue with the community and stakeholders. Regular meetings and consultations are conducted to clarify the main aspects of the project, address questions and concerns, and keep an open channel of communication.
- Multichannel communication: Considering the limited access to traditional communication channels in the region, the company is exploring alternatives. In addition to social media and apps, the company provides information to stakeholders through posters, printed leaflets, and a website.

- Measures to Reduce Impact: the company is aware of the necessity to minimize the impact on local areas. Accommodation for external workers is structured to adhere to conduct and behavior rules, providing an adequate structure.
- Involvement of Service Providers: the company holds contractors accountable for ensuring that workers follow rules and regulations, ensuring harmonious coexistence with the local community.
- Constant Monitoring and Evaluation: the company consistently monitors and evaluates the impacts and implemented mitigation measures, adjusting actions as necessary.

8.2.1.3.2. Changes in pressure exerted on roads

This impact refers to the transportation of the existing cattle at Project Alpha before transitioning to forestry. It is estimated that in August 2023, there were about 5,000 head of cattle on the farm that needed to be transported. The transportation will be carried out by trucks, and given the number of animals, it is expected that several trips will be made, impacting the roads in the region.

Project Alpha's mentioned that the destination for the sold cattle is the municipality of Miranda, which is 468 km from Figueirão. The most common route for moving cattle from Project Alpha to the municipality of Miranda is driving 111 km on MS-422 to Camapuã, followed by a stretch of MS-060 to the municipality of Bandeirantes. From there, access to BR-163 is possible. The trucks will continue on BR-163 until reaching the entrance of the capital, Campo Grande, where they will divert onto BR-262. On this highway, it takes about 200 km until reaching the final destination in Miranda.

According to the farm manager, each truck carries about 20 oxen. Therefore, a rough calculation suggests that at least 250 trips will be required to transport the cattle, and the deadline for the completion of this operation is November 2023. This would mean approximately six trips a day, starting in August.

In this manner, the impact is of **negative** nature, **direct** and **temporary** origin, as it will cease when the cattle are fully transported. Moreover, it is a **short-term** impact, of **regional** scope, involving several municipalities until reaching the final destination in Miranda. Finally, the impact is **reversible** and mitigable. The probability of occurrence is **certain**, and the magnitude is **low**, as the roads have the capacity to support the transportation of these cattle.

Table 8-9 - Impact Classification "Changes in pressure exerted on roads"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Direct	Direct

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Duration (cyclical, permanent, temporary)	Temporary	Temporary
Temporality (short, medium or long term)	Short-Term	Short-Term
Reach (restricted, local, regional)	Regional	Regional
Probability	Certain	Certain
Reversibility	Reversible	Reversible
Accumulation and Synergism:	Cumulative	Cumulative
Magnitude	Low	Low

The company is implementing measures to minimize the potential impacts associated with the transportation resulting from the phaseout of livestock activities at Project Alpha:

- Transportation Planning: the company has defined the optimal transportation routes to ensure efficient transportation, thereby reducing potential impacts.
- Driver training: Drivers undergo proper training to ensure safe vehicle operation and adherence to traffic laws, minimizing the risk of accidents on the roads.
- Impact Monitoring: the company has implemented monitoring systems to keep a close eye on transportation. This enables a rapid response to any problems that may arise.
- Communication with Local Communities: the company maintains an open communication channel with local communities along the transportation routes to keep residents informed about the process and address any concerns that may arise.
- Road Safety: To ensure road safety and minimize the impact on roads, the company carries out precautionary measures such as proper signage and road repairs if necessary.

8.2.1.3.3. Dismissal of workforce and job losses

This impact refers to the current cattle breeding activity, as the current workforce will be laid off when all cattle have been transported.

Currently, there are only six employees who are involved in cattle-related activities at Project Alpha. They have been working on the farm for periods ranging from six to 39 years and perform various functions, from general services to management. These professionals work on the books and, since 2022, they are aware of the transition of economic activity on the farm.

In a conversation with the six employees involved in livestock activities, it was reported that half of them wish to remain on the property, while the other half prefers to be dismissed. The reasons for wanting to stay include liking the area and being accustomed to living there. Those who wish to be dismissed stated that they are tired of working in the region and intend to seek new opportunities.

However, they mentioned in the interview that no meeting or conversation has taken place to inform them about how the dismissal of workforce will occur, or whether any of them can be integrated with the workers responsible for the forest. This concern is growing, especially since the projected end of activities is in November, and there is no indication of how the shutdown will be executed. It is important to highlight that the company conducts constant training and conversations with these workers.

The impact, without taking into account the adoption of mitigation measures, can be classified as **negative** and **direct**. Furthermore, it is **local**, **temporary**, and **short-term**. The impact can be considered **cumulative** and **irreversible**, as after the workers' dismissal, they must leave Project Alpha. Finally, it is of **average** magnitude. However, if mitigation measures are applied, the impact may become **reversible**, resulting in **low** magnitude.

Table 8-10 - Classification of the Impact "Dismissal of workforce and job losses"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Direct	Direct
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long term)	Short Term	Short Term
Reach (restricted, local, regional)	Local	Local
Probability	Certain	Certain
Reversibility	Irreversible	Reversible
Accumulation and Synergism:	Cumulative	Cumulative
Magnitude	Average	Low

The company is implementing measures to minimize the impacts related to the dismissal of workforce and jobs losses at Project Alpha based on an internal procedure (ISG 029 - Demobilization):

- Dialogue and Options for Remaining: the company is in constant dialogue with the workers who wish to remain on the property. Consideration is being given to the possibility of reassigning these workers to other forestry-related activities or to functions that are needed on the farm after the transition.
- Outplacement support: For workers who wish to seek new opportunities, the company is offering support in finding alternative employment. This can include help with preparing CVs, guidance on job opportunities in the region and support in identifying potential employers.

- Training and Capacity Building: For all workers, the company is considering training and capacity building programs so that they can acquire new skills that can be applied in future economic activities in the region.

8.2.1.3.4. Potential cultural conflicts

As explained in the section on local workers, many of them are from Brazil's northeastern region, with a contingent of workers from Bahia and Maranhão, primarily. According to an interview with employees, there was dissatisfaction with certain aspects of daily life, such as the type of meal offered on the farm and also the relationship with residents from the three municipalities.

It is worth noting that the company has specific procedures for meals and accommodation. Meals are guided by IST001 (providing occupational safety instructions on nutrition), which states that the menu offered to workers is planned in advance by nutritionists and provided for breakfast, lunch, and dinner. The manager of one of the lodgings reported that workers are free to eat elsewhere or even have access to the kitchen to prepare their own food. Regarding lodgings, there are also regulations that must be complied with by both the workers and those responsible for the accommodation, such as daily cleaning of the rooms, provision of bedding, and, as mentioned earlier, meals.

In addition, in Figueirão, the manager of Styllo Hotel reported that the arrival of people from other states caused unease in the local population. There were bigoted comments related to northeasterners, mainly due to differences in daily habits and cultural aspects such as accents

It's important to note that there were no complaints from any of the parties consulted regarding the behavior of the workers. However, there was apprehension because they were not from the region and were unfamiliar with the local residents.

Thus, the impact is classified as **negative**, **indirect**, and **temporary**. With and without mitigation measures, it manifests itself on a **medium-term**. The impact is **local**.

Table 8-11 - Impact Classification "Potential cultural conflicts"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Indirect	Indirect
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long term)	Medium-Term	Medium-Term
Reach (restricted, local, regional)	Local	Local
Probability	Likely	Likely

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Reversibility	Reversible	Reversible
Accumulation and Synergism:	Cumulative	Cumulative
Magnitude	Average	Low

The company implements measures to minimize potential cultural conflicts at Project Alpha:

- Cultural Guidance and Awareness: the company provides orientation for outsourced employees and cultural awareness initiatives for all employees who are not originally from the region. This includes information on local habits, culture, and traditions, as well as guidance on how to respect and interact appropriately with the local community.

8.2.1.3.5. Changes in water availability for properties around Project Alpha

There is considerable uncertainty and a lack of clarity about the impact of eucalyptus plantations on water availability for the properties surrounding Project Alpha. Some residents, especially those closest to the farm, have expressed concerns that eucalyptus could negatively affect water availability in the region. There is a perception that eucalyptus cultivation could lead to a reduction in the flow of springs, raising concerns, as some neighbors depend on these water resources for their personal needs and animal watering. Even though studies on this impact are underway, uncertainty persists, and it is important to consider the potential socio-economic impacts that may arise, requiring mitigation.

The impact is of **negative**, **indirect**, and **permanent** nature, as water is expected to be used throughout the implementation and planting of stands and forest recovery areas. Additionally, it is a **long-term**, **local**, and **likely** impact, as there is no certainty of water shortage, but it is **reversible** and **cumulative**. Without mitigation measures, the magnitude may be **high**, and with mitigation measures, the magnitude is **average**.

Table 8-12- Classification of Impact "Changes in water availability for properties around Project Alpha"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Indirect	Indirect
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long term)	Medium-Term	Medium-Term
Reach (restricted, local, regional)	Local	Local
Probability	Likely	Likely
Reversibility	Reversible	Reversible
Accumulation and Synergism:	Cumulative	Cumulative
Magnitude	High	Average

To minimize the impacts identified on the water availability of the properties surrounding Project Alpha due to eucalyptus plantations, the company has implemented the following measures:

- Continuous Dialogue with Residents: the company maintains a constant communication channel with residents, mainly through apps and social networks, to monitor water availability in the region. This dialogue aims to dispel residents' concerns and doubts and provide up-to-date information on the water situation.
- Water monitoring: Systematic monitoring of water availability in the springs and watercourses near the farm helps assess any negative impact and the adoption of timely measures, if necessary, to avoid water shortages.
- Environmental Education and Corporate Communication: the company conducts environmental education and corporate communication programs to raise residents' awareness of the responsible use of water resources. This includes informing about potential impacts on water quantity and quality and promoting the conservation of Permanent Preservation Areas and sustainable water-related practices.
- Springs Recovery Program: the company is developing and is in the process of implementing the Program for the Recovery and Restoration of Degraded Areas in the Permanent Preservation Areas at Project Alpha.

These measures aim to address residents' concerns, dispel doubts, and ensure that water availability in the region is adequately monitored and protected.

8.2.2. Operational Phase

8.2.2.1. Physical Environment

8.2.2.1.1. Changes in Surface and Groundwater Quality

According to the planned forest cycle, the eucalyptus stands will be managed for harvesting and replanting. The operation of these stands involves vehicles and machinery traffic. The use of roads and access routes can lead to the onset of erosion processes and the flow of sediment into watercourses, causing changes in water parameters. Additionally, there are 10 known areas that were degraded and/or altered in the past, when the farm was under the management of the former owner of Project Alpha. These areas are located along watercourses and springs, as identified in the Environmental Diagnosis. The company is implementing a Degraded Area Recovery Plan (PRADA) for these degraded areas

Additionally, and of greater relevance, is the use of chemicals practiced in forestry, such as glyphosate, sulfluramid, among other agrochemicals used in pest control, including direct application on the soil to combat ants. The use of agrochemicals can have potential impacts on the quality of groundwater and surface water. This includes the contamination of water by product residues, harming human health and aquatic life, as well as impacting aquatic biodiversity. Moreover, contamination can have long-term chronic effects on the aquatic ecosystem.

It is of paramount importance to reduce or eliminate environmental non-conformities identified on-site to mitigate these impacts. Aspects such as the proper handling of packaging, construction/implementation of appropriate areas for vehicle parking, and the correct maintenance of fuel tank locations must be inspected and rehabilitated throughout the project's operation. This includes the management of solid waste and sanitary effluents, as activities generating waste/effluents will intensify during the Operational Phase.

Thus, the impact due to the Change in Surface and Groundwater Quality can be considered **negative**, of **indirect** incidence, **permanent** duration, as the effect persists after triggering and doesn't cease with the interruption of the generating activity. It is of **short-term** and **likely** occurrence, emerging right at the beginning of the implementation of forest activities. It is of **regional** reach, as it may exceed the limits of the ADI and is **irreversible**, requiring mitigation measures for the impact to cease. Considering other farms in the region, this impact can be deemed **cumulative and synergistic**, potentially triggering new impacts. The magnitude of this impact is considered **high** due to its reach and the importance of the issue. With the application of mitigation measures, the impact has an **average** magnitude. The attributes for this impact between the Implementation and Operational Phases remain the same.

Table 8-13– Impact Classification "Changes in Surface and Groundwater Quality"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Indirect	Indirect
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long term)	Short	Short
Reach (restricted, local, regional)	Regional	Regional
Probability	Likely	Likely
Reversibility	Irreversible	Irreversible
Accumulation and Synergism:	Cumulative and Synergistic	Cumulative and Synergistic
Magnitude	High	Average

In order to minimize the identified impacts on surface and groundwater quality resulting from the management of the eucalyptus plantations, the use of agrochemicals, and the activities carried out at Project Alpha, the company implements and/or will implement measures such as:

- Degraded Area Recovery Plan (PRADA): the company has implemented and is implementing a PRADA related to the areas degraded in the past by cattle ranching under the management of the former owner along the watercourses and in the springs. This plan aims to restore these areas, reducing the risk of erosion and improving water quality.
- Agrochemicals Use: the company will adhere to regulations on the use of agrochemicals, including the controlled use of chemicals such as glyphosate and sulfluramid. The goal is to minimize agrochemical usage whenever possible to reduce contamination of groundwater and surface water. These practices are outlined in the Solid Waste Management and Chemicals Management Program, which incorporates all measures established by the IFC in this area.
- Remediation Measures: In the event of impacts on water quality, the company will implement the necessary mitigation measures to rehabilitate the water quality.
- Environmental Education: the company promotes environmental education programs to raise awareness among employees and residents of local communities about the importance of the responsible use of water resources and necessary sustainable practices.

These measures aim to protect water resources and minimize negative impacts on water quality. Additionally, the company has established other measures in its Work Instructions. As a complement, there is continuous environmental monitoring of surface and groundwater quality, as reported in the **Surface and Groundwater Qualitative and Quantitative Monitoring Program**. Waste management and the correct handling of chemicals are also in accordance with the **Solid Waste and Chemicals Management Program**.

8.2.2.1.2. Changes in Water Availability

This impact is associated with water abstraction for irrigation and the water demand related to monocultures. In the Operational Phase, the environmental aspects associated with this impact are the same as in the Implementation Phase. Considering the potential impact, it is now categorized as having cyclical duration, following the development and harvest phases.

In its management of Project Alpha, the company will implement environmental measures and sustainable forestry practices that prioritize the conservation of water availability. This involves adhering to guidelines and procedures established in work instructions, with a focus on minimizing water waste and continuously monitoring potential impacts on water sources.

The implementation of forest stands by the company takes into account the abstraction of water for irrigation at specific times and periods during the development of the eucalyptus plantations. Field monitoring is carried out to record the quantities of water collected and used to irrigate the eucalyptus seedlings, and the data is then sent to IMASUL.

Additionally, monocultures (not only eucalyptus) have a historical association with large groundwater consumption. It is mentioned that there is no precise information on the volumes necessary to supply the water consumption of eucalyptus, and there are no modeling studies relating to the natural recharge of water and its availability for the water drained from eucalyptus monocultures. In literature, there is no established definition on the subject.

Therefore, Changes in Water Availability is an impact of **negative** nature, which has a **direct** impact, considering the abstraction of surface water, having a **short-term** effect, and **temporary** and **reversible** duration, ceasing with the closure of activities. The territorial reach is considered **local**, staying within the ADI limits, of **likely** occurrence and classified as **cumulative and not synergistic**. Due to these characteristics and the continuous nature of the operational phase, the magnitude of the impact is classified as **high**. Once mitigation and monitoring measures have been successfully implemented, this impact is reduced to a **low** magnitude."

Table 8-14 – Impact Classification "Changes in Water Availability"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Direct	Direct
Duration (cyclical, permanent, temporary)	Cyclic	Cyclic
Temporality (short, medium or long term)	Short	Short
Reach (restricted, local, regional)	Local	Local
Probability	Likely	Likely
Reversibility	Reversible	Reversible
Accumulation and Synergism:	Non-Synergic Cumulative	Non-Synergic Cumulative
Magnitude	High	Low

In order to minimize the possible impacts identified at Project Alpha, associated with the abstraction of water for irrigation and the water demand related to monocultures, the company adopts/will adopt a series of environmental management measures and practices, such as:

- The company establishes guidelines and procedures in work instructions to ensure the responsible use of water, with a focus on minimizing waste. The work instructions on this subject are set out in the Surface and Groundwater Qualitative and Quantitative Monitoring Program.
- Degraded Area Recovery Plan (PRADA): the company has a Degraded Area Recovery Plan relating to areas degraded in the past as a result of cattle ranching and management activities. This plan aims to restore these areas, including the revegetation of riparian areas.
- The abstraction of water from waterbodies takes place after the declaration of water resources use approved by the environmental agency of the state of Mato Grosso do Sul - IMASUL.
- Field monitoring is carried out to record the amount of water collected and used to irrigate the eucalyptus seedlings.

These measures aim to conserve water availability, adopting proactive measures to minimize the impacts associated with water abstraction and the water demand for monocultures at Project Alpha. The measures listed above, along with other actions and procedures, are reported in the **Surface and Groundwater Qualitative and Quantitative Monitoring Program**.

8.2.2.1.3. Changes in Surface Dynamics

In the Operational Phase of eucalyptus fields, this impact is associated with the use of roads and access routes by vehicles and machinery, in addition to soil management for replanting according to the planned cycle, which may initiate erosive processes combined with the flow of sediments directed towards watercourses.

It can be observed that Project Alpha has 10 environmental liabilities that were degraded or altered in the past during the period when the land was under the management of the former owner for cattle ranching. These liabilities include areas of exposed soil in the Permanent Preservation Areas (APPs) of springs and watercourses, rendering them susceptible to sediment transportation and the silting up of rivers and streams. The company has established and is implementing an Altered and/or Degraded Area Recovery Plan (PRADA) aimed at restoring these impacted areas.

It is noted that Project Alpha is situated on gently undulating terrain of a moderate slope, characterized by essentially sandy soils that are susceptible to sediment transport when there is no vegetation cover.

The erosion and unwanted flows of water and sediments in the area intensify during the rainy season – a period in which the project's control measures should be intensified during the implementation.

Thus, Changes in Surface Dynamics is an impact of **negative** nature, with an **indirect** impact, resulting from activities on the land. It is of **short-term** duration, as changes may begin to appear shortly after the interventions, and **temporary**, as the impact is triggered until successful mitigation and control measures are taken, regardless of whether it is in the implementation or operational phase of the project.

The territorial reach can be considered **local**, staying within the **ADI** limits, and **reversible**, as the impact will cease with the implementation of control/mitigation measures. This impact is **certain** to occur, as it already manifests at Project Alpha regardless of the forestry operation. It is classified as **cumulative and not synergistic** – since other erosive processes are observed in the region without triggering new impacts. Considering all the characteristics described for this impact, if left untreated, its magnitude is considered **high**. However, with monitoring, mitigation, and control measures, its magnitude is considered **low**. This assessment considers the success of the PRADA measures for the area, among other actions. The attributes for this impact between the Implementation and Operational Phases remain the same.

Table 8-15 – Impact Classification "Changes in Surface Dynamics"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Indirect	Indirect
Duration (cyclical, permanent, temporary)	Temporary	Temporary
Temporality (short, medium or long-term)	Short	Short
Reach (restricted, local, regional)	Local	Local
Probability	Certain	Certain
Reversibility	Reversible	Reversible
Accumulation and Synergism:	Non-Synergic Cumulative	Non-Synergic Cumulative
Magnitude	High	Low

In order to minimize the possible impacts identified associated with surface dynamics and soil management at Project Alpha during the operation phase of the eucalyptus plantations, the company has a list of environmental management measures and practices. These include:

- During the operational phase, the company will intensify control measures, especially during rainy seasons, to minimize erosion processes and sediment flow. This may include the adoption of physical barriers, such as earthen embankments, to prevent the transportation of sediment into watercourses.

- The company has an Altered and/or Degraded Area Recovery Plan (PRADA) aimed at restoring areas that have been degraded and exposed by previous uses of the land. The PRADA aims to protect the soil by reducing its susceptibility to sediment transportation.
- The company will use soil management practices that reduce compaction and the risk of erosion.
- Protection of Permanent Preservation Areas (APPs): the company protects the exposed soil areas in the APPs of springs and watercourses, aiming for their natural restoration and maintenance with vegetation to prevent sediment transportation.
- Continuous Monitoring: the company will conduct continuous monitoring of erosion processes and sediment transport, adjusting control measures as necessary to ensure effectiveness.
- Training and Awareness: Employees and machine operators from service providers will receive training to adopt responsible soil management practices, including the importance of protecting sensitive areas.
- Adoption of Temporary Measures: the company, recognizing the short-term and temporality of the impact, adopts specific measures during interventions that can minimize the impact before the changes become more significant.
- Periodic Review: the company will periodically review the control measures and the effectiveness of the PRADA to ensure that they are working as planned.

The measures listed aim to protect sensitive areas, reduce erosion and sediment transport and ensure that the impact is of low magnitude. In addition to the above measures, other procedures for managing and monitoring the effectiveness of the actions are outlined in the **Erosion Control and Monitoring Program**.

8.2.2.2. Biotic Environment

8.2.2.2.1. Changes in Landscape

From the operation of Project Alpha, there will be a conversion of more than 2,000 hectares of pastures into native forest areas. These areas will contain individuals and species of native flora, contributing to seed dispersal to other fragments and acting as potential ecological corridors.

The impact of Changes in Landscape is considered **positive** in nature, with **direct** incidence. It is considered **permanent**, as it will last throughout the operational phase and beyond. The impact is **long-term**, as the forest matrix needs time to establish itself. Its occurrence is **certain** and it is considered an **irreversible** impact, as there is no planning to suppress this area. Its territorial reach is **regional**, and it is **not** considered a **cumulative or synergistic** impact. Its magnitude is **average**.

Table 8-16– Impact Classification "Changes in Landscape – operational phase"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Positive	Positive
Incidence	Direct	Direct
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long term)	Long	Long
Reach (restricted, local, regional)	Regional	Regional
Probability	Certain	Certain
Reversibility	Irreversible	Irreversible
Accumulation and Synergism:	Non-cumulative and non-synergic	Non-cumulative and non-synergic
Magnitude	Average	Does not apply

In order to maintain the identified positive impacts related to the Changes in Landscape at Project Alpha, the company adopts a series of management measures and practices. Here are the measures being carried out by the company to preserve and expand these positive impacts:

- Maintenance of Native Forest Areas: the company ensures the maintenance of the native forest areas that were established during the farm's operation. This includes protecting the individuals and species of native flora present in these areas.
- Species Conservation: the company adopts measures to ensure the conservation of the native flora species that inhabit the converted areas, including the promotion of plant diversity and the creation of suitable conditions for the survival of the species.
- Seed dispersal: the company encourages seed dispersal from these native forest areas, contributing to the restoration of other fragments of ecological vegetation in the region.
- Constant Monitoring: the company conducts constant monitoring of the converted areas to ensure that the conversion of pastures into native forest areas is effective and that the positive impacts are maintained over time.
- Promoting Ecological Corridors: the company recognizes the potential of converted areas to serve as ecological corridors and takes measures to promote this function. This may include connecting these areas with existing vegetation fragments.
- Environmental Education: the company promotes environmental awareness and education among its employees and local communities to highlight the importance of conserving the converted areas.
- Integration with the Regional Landscape: the company considers the integration of native forest areas with the regional landscape, seeking synergies with other conservation and environmental recovery initiatives in the area.

- Long-term Planning: As the impact is long-term, the company establishes long-term planning to ensure the maintenance of these native vegetation areas.

8.2.2.2.2. Increase in Wildlife Habitat

When the forest recovery areas are established, Project Alpha will see an increase of 2,599.78 hectares in native vegetation. This expansion will offer additional resources for animals, including shelter, food, fallow areas, etc. Additionally, while the silviculture area (with a future land use provision for a total area of 14,624.64 hectares) currently has exotic vegetation, it can still provide more shelter and resources than pasture areas.

The Increase in Wildlife Habitat impact is considered **positive** in nature, with **indirect** incidence. The impact is considered **permanent**, as it will last throughout the operational phase and beyond. The impact is **long-term**, since the forest matrix needs time to establish itself. Its occurrence is **certain** and it is an **irreversible** impact, as there is no planning to suppress this area. Its territorial reach is **regional**, and is **not** considered a **cumulative or synergistic** impact. Its magnitude is **average**. This increase in new areas and resources is directly in line with Performance Standard 6 ‘Biodiversity Conservation and Sustainable Management of Living Natural Resources’.

Table 8-17 – Impact Classification "Increase in Wildlife Habitat – operational phase"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Positive	Positive
Incidence	Indirect	Indirect
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long-term)	Long	Long
Reach (restricted, local, regional)	Local	Local
Probability	Certain	Certain
Reversibility	Irreversible	Irreversible
Accumulation and Synergism:	Non-cumulative and non-synergic	Non-cumulative and non-synergic
Magnitude	Average	Does not apply

In order to maintain the positive impacts related to the gain of habitats for fauna at Project Alpha, the company implements environmental management measures and practices:

- Protection and Maintenance of Forest Recovery Areas: the company ensures the protection and maintenance of the forest recovery areas that are being established. This includes preventing activities that could damage these areas.
- Fauna Monitoring: the company carries out constant monitoring of the fauna in the area, recording the species present and changes in habitat use. This helps to assess the positive impact over time.
- Conservation of Native Vegetation: the company is committed to conserving existing native vegetation and promoting the natural regeneration of degraded areas to provide shelter and resources for fauna.
- Promotion of Ecological Corridors: the company recognizes the potential of forest recovery areas to act as ecological corridors and takes measures to promote this function, including connecting them with other areas of native vegetation.
- Control of Exotic Species: the company implements exotic species control practices in the forestry area to ensure that they do not harm the local fauna and to maximize the provision of shelter and resources.
- Education and Awareness: the company raises awareness among its employees and local communities about the importance of conserving fauna and habitats, encouraging good coexistence practices.
- Sustainable Management Plan: the company has an FSC sustainable management plan in place at Project Alpha which includes specific guidelines for the protection of fauna and habitats, ensuring that operational activities are compatible with these objectives.
- Integration with the Regional Landscape: the company considers integrating the forest recovery areas with the regional landscape, through the connectivity of natural vegetation fragments to water resources, collaborating with other ecological conservation initiatives in the region.

To verify changes and gains in the fauna, the Fauna as an Indicator of Environmental Quality Monitoring Program is proposed.

8.2.2.2.3. Disturbance and Wildlife Removal

According to the planned forest cycle, eucalyptus stands will be managed for harvesting and replanting. These operations involve the transit of people, vehicles, and machinery, leading to increased noise. Consequently, the fauna that inhabits these areas (rodents, snakes, etc.) will be rescued, driven away and/or relocated to adjacent areas.

The impact 'Disturbance and Wildlife Removal' is considered to be of **negative** nature, with **direct** (associated with the process of cleaning areas) and **indirect** incidence (considering the impact of increased noise levels). The impact is **cyclical**, as it occurs cyclically throughout the operation, and **short-term**, as it manifests itself as soon as the management begins. It is of **certain** likelihood, but **reversible**, because as soon as the noise-generating activities cease, the impact also ceases. Its territorial reach is **local**, as it affects both the DAA and the ADI.

It is considered a **cumulative** and not synergistic impact. With the application of mitigation measures, its magnitude becomes **low**.

Table 8-18– Impact Classification "Disturbance and Wildlife Removal – implementation phase"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Direct and Indirect	Direct and Indirect
Duration (cyclical, permanent, temporary)	Cyclical	Cyclical
Temporality (short, medium or long-term)	Short	Short
Reach (restricted, local, regional)	Local	Local
Probability	Certain	Certain
Reversibility	Reversible	Reversible
Accumulation and Synergism:	Cumulative	Cumulative
Magnitude	Average	Low

The company implements various measures to minimize the possible impacts identified during the management of the reforestation and silviculture areas at Project Alpha:

- Staff Training: The staff involved in the operations receives ongoing specialized training to ensure that the process is conducted in a controlled and effective manner, taking environmental concerns into account.
- Environmental Restoration: Efforts are being made to restore areas adjacent to production areas, creating alternative environments for the affected terrestrial fauna, offering food, shelter, and conditions for resting and reproduction.
- Periodic Maintenance of Machinery and Vehicles: the company requires all service companies to check all machinery, equipment, and vehicles every three months for mechanical condition, smoke emissions, and noise levels.

To mitigate this impact, it is also suggested:

- Field management actions must occur one stand at a time or only in adjacent stands, to provide fauna with different escape routes.

8.2.2.2.4. Loss of Wildlife Individuals due to Stress, Run-Over and Hunting

According to the planned forest cycle, eucalyptus stands will be managed for harvesting and replanting. These operations involve the transit of people, vehicles, and machinery, leading to increased noise.

The increase in noise levels, increased human transit, and cleaning of the area during the implementation of activities at Project Alpha will lead to disturbance on wildlife. As a consequence, the fauna will be driven away to adjacent areas.

Some individuals undergo a stressful situation that, for some, can lead to death. Others, during the escape process, may end up being run over in the surrounding access roads. Finally, escaping makes individuals more susceptible to hunting. It is important to highlight that among all groups of terrestrial wildlife, hunted species were identified; whether for consumption, breeding, or related to human-wildlife conflicts.

The impact ‘Loss of Wildlife Individuals due to Stress, Run-Over and Hunting’ is considered of **negative** nature, with **indirect** incidence (arising from the impact ‘Disturbance and Wildlife Removal’). The impact is considered **cyclical**, as it occurs only during the management of stands, and **short-term**, as it manifests itself as soon as the management begins. It is **likely** to occur and **irreversible**. It is important to highlight that the impact was classified as **irreversible** considering the individuals who will be lost; not taking into account the wildlife as a whole.

Its territorial reach is **local**, as it affects both the DAA and the ADI. It is important to note that the operation of Project Alpha also involves timber transportation. Consequently, there is a considerable number of trucks transiting the roads, increasing the possibility of wildlife being run over. Although this area is not verifiable, as the wood will be transported to different regions of Brazil, it is important for drivers to be trained on the importance of wildlife and the necessity of following traffic laws.

It is considered a **cumulative and synergistic** impact along with the ‘Disturbance and Wildlife Removal’ impact. With the application of mitigation measures, its magnitude becomes **low**.

Table 8-19 – Impact Classification "Loss of Wildlife Individuals due to Stress, Run-Over and Hunting – implementation phase"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Indirect	Indirect
Duration (cyclical, permanent, temporary)	Cyclic	Cyclic
Temporality (short, medium or long-term)	Short	Short
Reach (restricted, local, regional)	Local	Local
Probability	Likely	Likely
Reversibility	Irreversible	Irreversible
Accumulation and Synergism:	Cumulative and Synergistic	Cumulative and Synergistic
Magnitude	Average	Low

The company implements various measures to minimize and mitigate the possible impacts identified during the implementation of activities at Project Alpha:

- Team Education and Training: The team involved in the implementation operations receives specialized training in dealing with wildlife, minimizing the occurrence of trampling and hunting in the area.
- Signposting and Traffic Control: Traffic control strategies, such as signposting sensitive areas and imposing speed limits on roads, are implemented to prevent wildlife from being hit by vehicles.
- Periodic Maintenance of Machinery and Vehicles: the company requires all service companies to check all machinery, equipment, and vehicles every three months for mechanical condition, smoke emissions, and noise levels.

To mitigate this impact, it is also suggested:

- Field management actions must occur one stand at a time or only in adjacent stands, to provide fauna with different escape routes.

8.2.2.3. Socio-economic Environment

8.2.2.3.1. Changes in local infrastructure and public services

The impact on public services is linked to the population increase in ADI generated by the recruitment, selection, and hiring of labor that will be accommodated in the municipalities of Costa Rica and Figueirão, in addition to the potential hiring of other suppliers. These actions, albeit indirectly, contribute to attracting people to the region in search of employment, leading to a dynamization of the local economy resulting from the enterprise. This, in turn, contributes to the population increase in the ADI.

Moreover, besides the strain on local public services, the influx of workers from outside the municipality (resulting from the aforementioned actions) will intensify the demand for new housing in the municipality, impacting the housing supply.

The change in economic activity at Project Alpha implies, among other things, an increase in the number of workers, especially forestry technicians, and possible family members who accompany them. These workers, often from other states, are accommodated in the municipalities of Costa Rica and Figueirão. In total, Project Alpha has 129 employees, with at least 50 of them residing in the municipality of Figueirão. It's important to note that while the impact has the potential to affect both the municipalities of Figueirão and Costa Rica, there is a greater potential for impact in the municipality of Figueirão. This is because the municipality is small and, therefore, more susceptible to population variations over a short period of time.

It follows that, although the number of workers is limited to just over 150 employees, there is a possibility of an impact considering the arrival of this contingent of people, especially in Figueirão.

In interviews with representatives of the town hall, including the deputy mayor, the Agribusiness Coordinator, the Executive Advisor, and the Development Coordinator, along with representatives of the six secretariats active in the territory, they pointed out that they recognize various positive aspects resulting from enterprises and companies establishing themselves in the municipality. This includes the generation of jobs and income, local development, and the possibility of social projects resulting from partnerships.

The company conducted a social survey to assess the potential impacts on the Area of Indirect Influence and concluded that the degree of impact is of little significance. This is because the number of outsourced employees housed in Figueirão, approximately 120 employees, represents around 3% of the local population, which totaled 3,539 inhabitants in 2022.

In the survey conducted by the company, on potential social impacts, it is important to note that the work carried out in the planting and maintenance phases is temporary and not permanent, following the forestry planning guidelines. Employees hired by service providers, from other cities and states, travel to the municipality of Figueirão and use only the accommodation provided by the contracting company. No families stay there; only the employees use the facilities. These workers must adhere to the company's housing policy, which defines guidelines for conduct and behavior. Additionally, the outsourced companies using the lodgings must follow internal regulations based on compliance with labor regulations to provide services to the company, ensuring worker conditions such as regular cleaning of the lodgings and the provision of meals.

The impact is of **negative** nature, with **direct** incidence and **permanent** duration or while the operation lasts. The impact manifests itself the **medium-term**, as the use of public services is not immediate. Additionally, the impact is **local**, **certain**, **reversible**, and **cumulative and synergistic**. If mitigation measures are implemented, the impact has an **average** magnitude, if the measures are not applied, it is **high**.

Table 8-20 - Impact Classification "Changes in local infrastructure and public services"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Direct	Direct
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long-term)	Medium-Term	Medium-Term
Reach (restricted, local, regional)	Local	Local
Probability	Certain	Certain
Reversibility	Reversible	Reversible
Accumulation and Synergism	Cumulative and synergistic	Cumulative and synergistic
Magnitude	High	Average

The company monitors this through the Social Progress Index (SPI) indicators and implements measures to address the expectations and concerns of stakeholders while minimizing the possible impacts identified in the Project Alpha region:

- Continuous Dialogue with the Community: the company recognizes the importance of continuous dialogue with the community and stakeholders. Regular meetings and consultations are held to clarify the main aspects of the project, address questions and concerns, and maintain an open communication channel.

- Multichannel communication: Given that the region has limited access to conventional communication channels, the company is exploring alternatives. In addition to social media and apps, the company provides information to stakeholders through posters, printed leaflets, and a website.
- Measures to Reduce Impact: the company is aware of the need to minimize the impact on local areas. Lodgings for external workers are arranged to follow conduct and behavior guidelines and provide an adequate structure.
- Involvement of Service Providers: the company holds contractors responsible for ensuring that workers follow the rules and regulations, ensuring harmonious coexistence with the local community.
- Constant Monitoring and Evaluation: the company constantly monitors and evaluates the impacts and mitigation measures implemented, adjusting actions as necessary.

8.2.2.3.2. Changes in tax collection

Several activities associated with the enterprise are subject to taxation, especially those related to the service provision and the circulation of goods. The primary tax to be generated during the operational phase is the Tax on the Circulation of Goods and Service Provision (ICMS). This tax will be levied on the circulation of goods and on services of interstate and intermunicipal transportion and communication. This impact is exclusive to the municipality of Camapuã.

In relation to the Municipal Services Tax (ISS), the collection will be significant, as this tax also has a strong association with industrial and port activity. It focuses, for example, on agency and industrial services, storage, loading and unloading of goods, logistics services, and customs clearance services, among others.

The change in economic activity at Project Alpha will also have impact on the taxes received by the government. It should be noted that Project Alpha is accountable to the municipality of Camapuã; thus, it is responsible for collecting municipal taxes on the property.

Table 8-21 - Impact Classification "Changes in tax collection"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Under analysis.	Under analysis/to be verified.
Incidence	Direct	Direct
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long-term)	Medium-Term	Medium-Term
Reach (restricted, local, regional)	Local	Local

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Probability	Certain	Certain
Reversibility	Reversible	Reversible
Accumulation and Synergism	Cumulative and synergistic	Cumulative and synergistic
Magnitude	Under analysis.	Under analysis/to be verified.

The company implements measures to minimize the potential impacts on tax collection in the Project Alpha region related to the change in economic activity. The main measures implemented by the company to deal with these potential impacts are:

- Fiscal Legality: the company maintains fiscal legality, ensuring compliance with all fiscal and tax obligations related to the venture's activities. This includes the proper payment of ICMS and ISS, as required.
- Tax Planning: the company adopts tax planning strategies to optimize the tax burden. This may involve seeking tax incentives and adopting practices that legally reduce taxation.
- Compliance with Municipal Obligations: the company complies with all tax obligations toward the municipality of Camapuã, where the farm is located. This includes paying municipal taxes according to the activities carried out.
- Contribution to Local Development: the company recognizes the importance of its activities for the local economy and seeks to contribute to the development of the region. This may include generating jobs, stimulating local businesses, and promoting complementary economic activities, as well as social programs carried out with communities in the ADI and AII aimed at generating employment and income.
- Compliance with the Law: the company acts in compliance with all tax laws and regulations, ensuring that all operations are carried out in accordance with the established standards.

8.2.2.3.3. Improvement of local economy

The arrival of new ventures in a region tends to improve local economy, as it is common to expand the offer of direct and indirect jobs, resulting in the absorption of the local workforce and the influx of workers and their family members. The expansion of the workforce and the investments made produce a chain reaction that results in an increase in trade and services in the region, stimulating the industries and sectors, and reducing the idle workforce.

It is also worth mentioning that there is a tendency for the smaller or less developed a location is, the greater the impacts felt by the arrival of new ventures. In this sense, it is worth noting that the municipalities in the Area of Direct Influence have different economic realities, despite all of them being linked to the agricultural sector. Figueirão, for example, has a small population of approximately 3,500 residents and little economic diversification.

The company carried out a social survey to assess the potential impacts on the Area of Indirect Influence and concluded that the degree of impact is of little significance. This is due to the fact that the number of outsourced employees housed in Figueirão, which is approximately 120 employees, represents around 3% of the local population, which totaled 3,539 inhabitants in 2022.

However, at the moment, the increase in the number of accommodations or the arrival of new workers is not foreseen. In this way, the impact tends to stabilize in a short period of time, rebalancing the local economy.

In the survey conducted by the company, on potential social impacts, it is important to note that the work carried out in the planting and maintenance phases is temporary and not permanent, following the forestry planning guidelines. Employees hired by service providers, from other cities and states, travel to the municipality of Figueirão and use only the accommodation provided by the contracting company. No families stay there; only the employees use the facilities. These workers must adhere to the company's housing policy, which defines guidelines for conduct and behavior. Additionally, the outsourced companies using the lodgings must follow internal regulations based on compliance with labor regulations to provide services to the company, ensuring worker conditions such as regular cleaning of the lodgings and the provision of meals.

The municipality of Costa Rica, on the other hand, has a more diversified and dynamic economy and service offers. Therefore, the possibility of using accommodation is favorable without having a significant impact on the municipality. However, it is plausible to consider that these impacts may occur, albeit to a limited extent. Therefore, it is necessary to monitor them either by observing socio-economic indicators or through periodic meetings with public authorities and the municipality's main stakeholders, such as community association leaders and business leaders. Camapuã, in turn, is even less affected since there is no forecast for a concentration of workers in the municipality.

In this way, the impact is of **positive** and **indirect** nature. In addition, it can be considered a **permanent** and **long-term** impact, as the improvement tends to remain as long as there is activity. The impact is **local**, **certain** and **reversible**. It can be mitigated through the monitoring of socio-economic indicators. In addition, the impact is **cumulative** with the impact of Changes in local infrastructure and public services. The magnitude of the impact is **low**.

Table 8-22- Classification of the Impact "Improvement of local economy"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Positive	Positive
Incidence	Indirect	Indirect
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long-term)	Long-Term	Long-Term
Reach (restricted, local, regional)	Local	Local
Probability	Certain	Certain
Reversibility	Reversible	Reversible
Accumulation and Synergism	Cumulative and synergistic	Cumulative and synergistic
Magnitude	Low	Low

The company monitors the Social Progress Index (SPI) indicators and implements measures to address the expectations and concerns of stakeholders while minimizing the possible impacts identified in the Project Alpha region:

- Continuous Dialogue with the Community: the company recognizes the importance of continuous dialogue with the community and stakeholders. Regular meetings and consultations are held to clarify the main aspects of the project, address questions and concerns, and maintain an open communication channel.
- Multichannel communication: Given that the region has limited access to conventional communication channels, the company is exploring alternatives. In addition to social media and apps, the company provides information to stakeholders through posters, printed leaflets, and a website.
- Measures to Reduce Impact: the company is aware of the need to minimize the impact on local areas. Lodgings for external workers are arranged to follow conduct and behavior guidelines and provide an adequate structure.
- Involvement of Service Providers: the company holds contractors responsible for ensuring that workers follow the rules and regulations, ensuring harmonious coexistence with the local community.
- Constant Monitoring and Evaluation: the company constantly monitors and evaluates the impacts and mitigation measures implemented, adjusting actions as necessary.

8.2.2.3.4. Changes in pressure exerted on roads

The environmental impact ‘Changes in pressure exerted on roads’ was analyzed in two ways. The first deals with the routine operation of Project Alpha, which includes the transportation of workers, customers, and forest inputs, thus generating pressure on the existing road network. The second aspect deals with the eucalyptus timber harvesting, selling, and transporting cycles, activities that will occur on a cyclical basis, every seven years. Both will imply an increased traffic of vehicles accessing local roads and highways, thereby generating pressure on the existing road network. Thus, there may be losses for the residents of the properties close to the project, as well as for the ADI.

As described in the section on transportation, the municipalities in the area of influence are served by state highways, and some of them, such as MS-422, are unpaved, which can hinder the traffic of vehicles, especially in the rainy season when there is a greater chance of getting stuck.

It is important to highlight that there are daily buses departing from Costa Rica and Figueirão taking the workers to Project Alpha. They depart in the morning and return after 5 p.m.

Regarding the trucks that will be transporting forestry products in the future, it is plausible to predict that when the operation is fully operational, the flow of trucks will be affected, especially on the highways that are essential for access to major cities, such as MS-060, MS-223, and MS-422. Additionally, it is important to note that the eucalyptus forest cycle, from planting to timber harvesting, is carried out according to commercial purposes. Therefore, the impact resulting from this transportation will be cyclical, with the renewal of forest stands throughout the forest cycle.

Considering the difference in the traffic of trucks when comparing routine operation and eucalyptus timber harvesting and selling activities, it was decided to classify the impact twice, as routine activities are permanent, whereas timber harvesting and selling activities are cyclical. While routine activities have low magnitude, timber harvesting and selling activities have average magnitude, provided that mitigation measures are applied. In both classifications, the impact is considered **negative**, **direct**, and **short-term**. The occurrence is **certain**, its reach is **regional** and, particularly during timber harvesting and selling, it reaches several municipalities until the arrival at the final destination. Finally, the impact is **reversible** and mitigable.

Table 8-23 - Impact Classification "Changes in pressure exerted on roads"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Direct	Direct
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long-term)	Short-Term	Short-Term
Reach (restricted, local, regional)	Regional	Regional
Probability	Certain	Certain
Reversibility	Reversible	Reversible
Accumulation and Synergism	Cumulative	Cumulative
Magnitude	Low	Low

Table 8-24 - Impact Classification "Changes in pressure exerted on roads – timber harvesting and selling"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Direct	Direct
Duration (cyclical, permanent, temporary)	Cyclic	Cyclic
Temporality (short, medium or long-term)	Short-Term	Short-Term
Reach (restricted, local, regional)	Regional	Regional
Probability	Certain	Certain
Reversibility	Reversible	Reversible
Accumulation and Synergism	Cumulative	Cumulative
Magnitude	High	Average

The company is implementing measures to minimize potential impacts related to road transport in the region of the DAA, ADI, and AII of Project Alpha:

- Transportation Planning: the company has defined the optimal transportation routes to ensure efficient transportation, thereby reducing potential impacts.
- Driver training: Drivers undergo proper training to ensure safe vehicle operation and adherence to traffic laws, minimizing the risk of accidents on the roads.
- Impact Monitoring: the company has implemented monitoring systems to keep a close eye on transportation. This enables a rapid response to any problems that may arise.
- Communication with Local Communities: the company maintains an open communication channel with local communities along the transportation routes to keep residents informed about the process and address any concerns that may arise.
- Road Safety: To ensure road safety and minimize the impact on roads, the company carries out precautionary measures such as proper signage and road repairs if necessary.

8.2.2.3.5. Changes in water availability for properties around Project Alpha

The change in water availability is influenced by several factors, including the high consumption of water in large-scale monocultures, especially in arid climates, the abstraction of water from bodies of water for irrigation in forestry operations and changes in soil drainage that lead to the siltation of rivers and streams. In the case of eucalyptus plantations, there is no precise information on the volume of water needed to meet the demands of the plantations, nor are there modeling studies relating the natural recharge of water to its availability for consumption in eucalyptus monocultures, due to the lack of an established definition on the subject in literature. These aspects are taken into account when assessing possible impacts.

The company, in its management of Project Alpha, implements environmental programs and sustainable forestry practices that prioritize the conservation of water availability. These initiatives aim to ensure that the activity does not harm aquatic ecosystems and the local communities that depend on water. This involves the use of guidelines and procedures established in work instructions, with a focus on minimizing water waste and continuously monitoring possible impacts on water sources.

The farm has areas that were degraded or altered during the previous activities, related to livestock and cattle handling. These areas, devoid of riparian vegetation, are located along watercourses and in springs (Permanent Preservation Areas), as identified in the Environmental Diagnosis. The company has a Degraded Area Recovery Plan (PRADA) for these areas.

The implementation of forest stands by the company takes into account the abstraction of water for irrigation at specific times and periods during the development of the eucalyptus plantations. Water is only abstracted from bodies of water with the appropriate declaration of water resources use approved by the environmental agency of the state of Mato Grosso do Sul - IMASUL. In addition, field monitoring is carried out to record the quantities of water collected and used to irrigate the eucalyptus seedlings, before sending the data to IMASUL.

The impact in question is of **negative**, **indirect** and **permanent** nature, considering that the irrigation of the stands occurs throughout the growth cycle and subsequent replanting. In addition, it is a **long-term**, **local**, and **likely** impact, as there is no certainty of water shortage, but it is **reversible** and **cumulative**. If mitigation measures are not adopted, the magnitude may be **high.** If adopted, the magnitude is **average**.

Table 8-25 - Classification of Impact - "Changes in water availability for properties around Project Alpha"

Variable	Impact without application of mitigation measures	Impact with application of mitigation measures
Nature	Negative	Negative
Incidence	Indirect	Indirect
Duration (cyclical, permanent, temporary)	Permanent	Permanent
Temporality (short, medium or long term)	Medium Term	Medium Term
Reach (restricted, local, regional)	Local	Local
Probability	Likely	Likely
Reversibility	Reversible	Reversible
Accumulation and Synergism:	Cumulative	Cumulative
Magnitude	High	Average

To minimize the impacts identified on the water availability of the properties surrounding Project Alpha due to eucalyptus plantations, the company has implemented the following measures:

- Continuous Dialogue with Residents: the company maintains a constant communication channel with residents, mainly through apps and social networks, to monitor water availability in the region. This dialogue aims to dispel residents' concerns and doubts and provide up-to-date information on the water situation.
- Water Monitoring: Systematic monitoring of water availability in the springs and watercourses on the farm. This helps to assess any negative impact and take timely measures, if necessary, to avoid water shortages.
- Environmental Education and Corporate Communication: the company carries out environmental education and corporate communication programs in order to make residents aware of the responsible use of water resources. This includes informing about the possible impacts on water quantity and quality and promoting the conservation of Permanent Preservation Areas and sustainable water-related practices.
- Spring Recovery Program: the company is developing and is in the process of implementing the Degraded Area Recovery Plan in Permanent Preservation Areas at Project Alpha.
- Timely Mitigation Measures: If the monitoring indicates a significant reduction in water availability due to the eucalyptus plantation activity, the company will promptly implement mitigation measures. This may include actions to preserve the springs and maintain the water supply for residents.

9. ANALYSIS OF HEALTH AND SAFETY STANDARDS AND RISKS

Occupational health and safety involves a set of technical, educational, medical, and psychological measures used to prevent accidents, either by eliminating unsafe conditions in the workplace or by instructing or convincing people to implement preventive practices. In essence, they are methods that seek to protect workers in the workplace by avoiding potential risks and dangers. The verification of relevant health and safety standards and procedures is in line with IFC's Performance Standard 2, discussed below.

The importance of this area lies not only in preventing accidents or illnesses, but also in promoting a more harmonious and productive working environment. Workers who feel that their health and well-being are valued are more likely to feel satisfied, motivated, and committed to their tasks. In addition, companies that prioritize health and safety often see reductions in absenteeism, turnover, and costs related to accidents and occupational illnesses.

It is crucial to understand that health and safety at work is not the sole responsibility of managers, the health and safety team, or the HR department; it is a collective commitment. Everyone, from top management to shop floor workers, has a role to play in ensuring that safe practices are always followed and that risks are identified and managed properly.

In a globalized context, with growing challenges and complexities, occupational health and safety are becoming more than just a formality - they are pillars for sustainable, responsible, and successful companies. Valuing and investing in this field is not only an ethical and legal duty, but also a smart strategy for long-term success.

9.1. STANDARDS AND LEGISLATION APPLICABLE TO THE PROJECT

9.1.1. Regulatory Standards (NR)

The Occupational Health and Safety **Regulatory Standards (NRs)**, published by Ordinance No. 3.214/78, consist of obligations, rights, and duties to be fulfilled by employers and workers with the aim of guaranteeing safe and healthy work, preventing the occurrence of occupational diseases and accidents. They were established by Brazil's Ministry of Labor and Employment (MTE) and their main objective is to ensure that workers carry out their activities in safe environments, minimizing or eliminating the risk of accidents and occupational illnesses.

These rules are mandatory for private and public companies, as well as for government agencies that have employees governed by the Consolidation of Labor Laws (CLT). There are several NRs covering a wide range of topics, from general safety requirements to specific guidelines for certain activities or sectors.

Compliance with the NRs does not exempt companies from applying other legislation with related provisions or international occupational health and safety standards adopted under international agreements and conventions. In other words, the NRs act as a minimum standard to be followed, and other rules or regulations can be applied together, as long as they provide the same or greater degree of protection for the worker.

Applicable Regulatory Standards

The Regulatory Standards are subdivided into General, Special and Sectoral.

Standards classified as ‘General’ regulate aspects arising from the legal relationship provided for in the law without being conditioned to other requirements, such as activities, facilities, equipment, or specific economic sectors and activities. Therefore, they are mandatory and applicable to the project. These are:

NR-1 - General Provisions and Occupational Risk Management
NR-3 - Embargo or Prohibition
NR-4 - Specialized Services in Occupational Health and Safety (SESMT)
NR-5 - Internal Accident Prevention Commission (CIPA)
NR-7 - Occupational Health and Medical Monitoring Program (PCMSO)
NR-9 - Assessment and Control of Occupational Exposure to Physical, Chemical, and Biological Agents
NR-17 - Ergonomics
NR-28 - Enforcement and Penalties

Standards classified as ‘Special’ are those that regulate the implementation of work considering the activities, installations, or equipment used, without being conditioned to specific economic sectors or activities.

The following Special standards apply to the project:

NR-6 - Personal Protective Equipment (PPE)
NR-11 - Transportation, Movement, Storage and Handling of Materials

NR-12 - Machinery and Work Equipment Safety
NR-15 - Unhealthy Activities and Operations
NR-21 - Open-Air Work
NR-23 - Fire Protection
NR-24 - Sanitary and Comfort Conditions in the Workplace
NR-25 - Industrial Waste
NR-26 - Safety Signs

Standards classified as ‘Sectoral’ regulate the implementation of work in specific economic sectors or activities.

The following industry standard applies to the project:

NR-31 - Health and Safety at Work in Agriculture, Livestock, Forestry, Logging and Aquaculture

It is important to consider that the analysis of the standards is carried out by a qualified occupational safety professional. This professional defines the means of implementation in the company's operations and, in addition, evaluates the application of other NRs throughout the implementation of operations, such as **NR-10**, Safety in Electrical Installations and Services, **NR-16** - Hazardous Activities and Operations, **NR-35,** Working at Heights, among others.

9.1.2. International Finance Corporation (IFC) - Performance Standards on Social and Environmental Sustainability

The International Finance Corporation (IFC) is a member institution of the World Bank Group. Founded in 1956, IFC's main objective is to support the private sector in developing countries, contributing to poverty reduction and promoting sustainable development.

IFC's Sustainability Framework articulates the Corporation's strategic commitment to sustainable development and is an integral part of IFC's approach to risk management. The Sustainability Framework comprises the Sustainability Policy, Performance Standards, and Access to Information Policy.

The Performance Standards are aimed at clients, providing guidance on how to identify risks and impacts and are intended to help avoid, minimize, and manage risks and impacts as a way of doing business sustainably. This includes stakeholder engagement and disclosure obligations on the part of the client with regard to activities within the scope of the project. Specifically for Project Alpha and items related to health and safety, Performance Standards 1 and 2 stand out.

9.1.2.1.1. Performance Standard 2 - Labor and Working Conditions

Performance Standard 2 deals with the labor and working conditions provided to the company's workers. Within this context, Working Conditions and Worker-Management Relationship, Protection of the Workforce, Occupational Health and Safety, Outsourced Workers, and the Supply Chain are addressed.

With regard to Occupational Health and Safety, Performance Standard 2 determines the need for companies to act to prevent accidents, injuries, and illnesses resulting from employees' work activities, seeking to minimize hazards and control risk conditions for workers.

In order to meet Performance Standard 2, with regard to promoting health and safety for workers, IFC defines that the following actions must be addressed by the company:

1. Identification of potential hazards to workers, particularly those that may be life-threatening.
2. Provision of preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances.
3. Training of workers.
4. Documentation and reporting of occupational accidents, diseases, and incidents.
5. Emergency prevention, preparedness, and response arrangements.

The above processes are part of the company's health and safety hazard and risk management system and should be assessed by a qualified occupational safety professional, who defines the means of implementing them in the company's operations.

9.2. RISK SCENARIOS AND CONTROL MEASURES

During the implementation of the project's activities, there will be risk conditions to which those carrying out the tasks will be exposed to, and, in accordance with national and international occupational health, safety and environmental standards and legislation, there must be means to eliminate, neutralize or control these risks in order to guarantee everyone's health and safety.

Below are the main risk scenarios and control measures according to each stage of the project.

Table 9-1– Risk Scenarios and Respective Control Measures.

Project Stage	Activity	Risk Scenario	Control Measure
Removal of animals in the pasture area (cattle)	Animal management (cattle)	Being attacked by animals (cattle)	Workers must be trained and qualified to handle animals safely. All workers must be trained on how to act in the event of cattle attack.
Removal of animals in the pasture area (cattle)	Animal management (cattle)	Being attacked by various animals found in pasture areas.	Provide all the necessary safety equipment to protect against animals such as snakes, spiders, insects and other wild animals. All workers must be trained on how to act in the event of animal attack.
Removal of animals in the pasture area (cattle)	Animal management (cattle)	Falls (same level and different level)	Safety boots must be provided for all workers who will be handling the animals; All workers should be instructed on the risks of falling when walking on grassland; If it is necessary to use horses to herd cattle, the workers carrying out the task must have experience in the activity and only use saddled horses. The saddles must be in perfect condition for use.
Removal of animals in the pasture area (cattle)	Animal management (cattle)	Exposure to bad weather (solar radiation, rain, fog, lightning)	All weather protection equipment must be provided, such as raincoats, boots, sunscreen, hats, long-sleeved uniforms, and more. Workers should not be exposed to critical weather conditions (such as heat, heavy rain and lightning). The company must instruct all workers to seek shelter in the event of critical weather conditions.
Soil preparation and Area cleaning	Handling hand tools	Cutting, crushing parts of the body	Workers must be trained and authorized to carry out the activity. Provide protective gloves resistant to cutting and crushing. Provide workers with suitable tools and advise them not to use damaged tools and/or tools in poor condition and not to improvise tools. Clearly communicate which channel workers should use to request new tools and other work equipments. Workers must be instructed on the following: never to use their hands as a guide for cuts, not to clean tools without wearing protective gloves, not to expose body parts to cutting and crushing points, to keep tools protected and organized when not in use and to check tools before using them, not to service tools without prior knowledge, to use tools properly and only for the right purpose.
Soil preparation and Area cleaning	Execution of Operational Practices	Being attacked by various animals	Provide all the necessary safety equipment to protect against animals such as snakes, spiders, insects and other wild animals. All workers must be trained on how to act in the event of animal attack.
Soil preparation and Area cleaning	Execution of Operational Practices	Forest fires	Adopt fire prevention measures, such as proper maintenance of machinery and equipment. Keep an environmental emergency kit near the machines. Provide training for workers on the actions to be taken in the event of forest fires.

Project Stage	Activity	Risk Scenario	Control Measure
Soil preparation and Area cleaning	Execution of Operational Practices	Exposure to bad weather (solar radiation, rain, fog, lightning)	All weather protection equipment must be provided, such as raincoats, boots, sunscreen, hats, long-sleeved uniforms, and more. Depending on the weather conditions, the activity should be halted until normality returns. Workers should not be exposed to critical weather conditions (such as heat, heavy rain and lightning). The company must instruct all workers to seek shelter in the event of critical weather conditions.
Soil preparation and Area cleaning	Handling chemicals	Contact with chemicals, leaks and spills	Workers must be trained and authorized to carry out the activity. Provide all the appropriate personal and collective protection equipment (PPE/CPE) for each type of chemical handled. The Safety Data Sheet of all the chemicals handled must be available at the workplace. In the event of leaks or spills, the activity should be stopped, the leak contained, emergency blankets and kits used, and the equipment serviced upon return.
Soil preparation and Area cleaning	Handling chemicals	Exposure to bad weather (solar radiation, rain, fog, lightning)	All weather protection equipment must be provided, such as raincoats, boots, sunscreen, hats, long-sleeved uniforms, and more. Depending on the weather conditions, the chemicals application should be halted until normality returns. Workers should not be exposed to critical weather conditions (such as heat, heavy rain and lightning). The company must instruct all workers to seek shelter in the event of critical weather conditions.
Soil preparation and Area cleaning	Operating machinery and equipment	Traffic collision, animal collision and leak control	Workers must be trained and authorized to operate machinery and equipment in accordance with national and international occupational health and safety standards. Workers will go through training for defensive driving and fauna care. The practice of checking equipment on a daily basis using a checklist should be implemented. The company must provide all the appropriate personal and collective protective equipment (PPE/CPE) for each type of machine/equipment that will be operated. In the event of leaks or spills, the activity should be stopped, the leak contained, emergency blankets and kits used, and the equipment serviced upon return.
Implementation and maintenance of roads and firebreaks	Handling hand tools	Cutting, crushing parts of the body	Workers must be trained and authorized to carry out the activity. Provide protective gloves resistant to cutting and crushing. Provide workers with suitable tools and advise them not to use damaged tools and/or tools in poor condition and not to improvise tools. Clearly communicate which channel workers should use to request new tools and other work equipments. Workers must be instructed on the following: never to use their hands as a guide for cuts, not to clean tools without wearing protective gloves, not to expose body parts to cutting and crushing points, to keep tools protected and organized when not in use and to check tools before using them, not to service tools without prior knowledge, to use tools properly and only for the right purpose.

Project Stage	Activity	Risk Scenario	Control Measure
Implementation and maintenance of roads and firebreaks	Operating machinery and equipment	Traffic collision, animal collision and leak control	Workers must be trained and authorized to operate machinery and equipment in accordance with national and international occupational health and safety standards. Workers will go through training for defensive driving and fauna care. The practice of checking equipment on a daily basis using a checklist should be implemented. The company must provide all the appropriate personal and collective protective equipment (PPE/CPE) for each type of machine/equipment that will be operated. In the event of leaks or spills, the activity should be stopped, the leak contained, emergency blankets and kits used, and the equipment serviced upon return.
Implementation and maintenance of roads and firebreaks	Execution of Operational Practices	Forest fires	Adopt fire prevention measures, such as proper maintenance of machinery and equipment. Keep an environmental emergency kit near the machines. Provide training for workers on the actions to be taken in the event of forest fires.
Implementation and maintenance of roads and firebreaks	Execution of Operational Practices	Being attacked by various animals	Provide all the necessary safety equipment to protect against animals such as snakes, spiders, insects and other wild animals. All workers must be trained on how to act in the event of animal attack.
Implementation and maintenance of roads and firebreaks	Execution of Operational Practices	Exposure to bad weather (solar radiation, rain, fog, lightning)	All weather protection equipment must be provided, such as raincoats, boots, sunscreen, hats, long-sleeved uniforms, and more. Depending on the weather conditions, the activity should be halted until normality returns. Workers should not be exposed to critical weather conditions (such as heat, heavy rain and lightning). The company must instruct all workers to seek shelter in the event of critical weather conditions.
Planting seedlings (eucalyptus and native vegetation)	Handling hand tools	Cutting, crushing parts of the body	Workers must be trained and authorized to carry out the activity. Provide protective gloves resistant to cutting and crushing. Provide workers with suitable tools and advise them not to use damaged tools and/or tools in poor condition and not to improvise tools. Clearly communicate which channel workers should use to request new tools and other work equipments. Workers must be instructed on the following: never to use their hands as a guide for cuts, not to clean tools without wearing protective gloves, not to expose body parts to cutting and crushing points, to keep tools protected and organized when not in use and to check tools before using them, not to service tools without prior knowledge, to use tools properly and only for the right purpose.

Project Stage	Activity	Risk Scenario	Control Measure
Planting seedlings (eucalyptus and native vegetation)	Operating machinery and equipment	Traffic collision, animal collision and leak control	Workers must be trained and authorized to operate machinery and equipment in accordance with national and international occupational health and safety standards. Workers will go through training for defensive driving and fauna care. The practice of checking equipment on a daily basis using a checklist should be implemented. The company must provide all the appropriate personal and collective protective equipment (PPE/CPE) for each type of machine/equipment that will be operated. In the event of leaks or spills, the activity should be stopped, the leak contained, emergency blankets and kits used, and the equipment serviced upon return.
Planting seedlings (eucalyptus and native vegetation)	Execution of Operational Practices	Being attacked by various animals	Provide all the necessary safety equipment to protect against animals such as snakes, spiders, insects and other wild animals. All workers must be trained on how to act in the event of animal attack.
Planting seedlings (eucalyptus and native vegetation)	Execution of Operational Practices	Forest fires	Adopt fire prevention measures, such as proper maintenance of machinery and equipment. Keep an environmental emergency kit near the machines. Provide training for workers on the actions to be taken in the event of forest fires.
Planting seedlings (eucalyptus and native vegetation)	Execution of Operational Practices	Exposure to bad weather (solar radiation, rain, fog, lightning)	All weather protection equipment must be provided, such as raincoats, boots, sunscreen, hats, long-sleeved uniforms, and more. Depending on the weather conditions, the activity should be halted until normality returns. Workers should not be exposed to critical weather conditions (such as heat, heavy rain and lightning). The company must instruct all workers to seek shelter in the event of critical weather conditions.
Planting seedlings (eucalyptus and native vegetation)	Handling chemicals	Contact with chemicals, leaks and spills	Workers must be trained and authorized to carry out the activity. Provide all the appropriate personal and collective protection equipment (PPE/CPE) for each type of chemical handled. The Safety Data Sheet of all the chemicals handled must be available at the workplace. In the event of leaks or spills, the activity should be stopped, the leak contained, emergency blankets and kits used, and the equipment serviced upon return.
Planting seedlings (eucalyptus and native vegetation)	Handling chemicals	Exposure to bad weather (solar radiation, rain, fog, lightning)	All weather protection equipment must be provided, such as raincoats, boots, sunscreen, hats, long-sleeved uniforms, and more. Depending on the weather conditions, the chemicals application should be halted until normality returns. Workers should not be exposed to critical weather conditions (such as heat, heavy rain and lightning). The company must instruct all workers to seek shelter in the event of critical weather conditions.

Project Stage	Activity	Risk Scenario	Control Measure
Planting seedlings (eucalyptus and native vegetation)	Surface water collection (Irrigation)	Traffic collision, animal collision and leak control	Workers must be trained and authorized to operate machinery and equipment in accordance with national and international occupational health and safety standards. Conduct defensive driving and fauna care training. The practice of checking equipment daily using a checklist should be implemented. The company must provide all the appropriate personal and collective protection equipment (PPE/EPC) for each type of machine/equipment that will be operated. In the event of leaks or spills, the activity should be stopped, the leak contained, blankets and emergency kits used and the equipment serviced upon return.
Plantation maintenance	Handling chemicals	Contact with chemicals, leaks and spills	Workers must be trained and authorized to carry out the activity. Provide all the appropriate personal and collective protection equipment (PPE/CPE) for each type of chemical handled. The Safety Data Sheet of all the chemicals handled must be available at the workplace. In the event of leaks or spills, the activity should be stopped, the leak contained, emergency blankets and kits used, and the equipment serviced upon return.
Plantation maintenance	Handling chemicals	Exposure to bad weather (solar radiation, rain, fog, lightning)	All weather protection equipment must be provided, such as raincoats, boots, sunscreen, hats, long-sleeved uniforms, and more. Depending on the weather conditions, the chemicals application should be halted until normality returns. Workers should not be exposed to critical weather conditions (such as heat, heavy rain and lightning). The company must instruct all workers to seek shelter in the event of critical weather conditions.
Plantation maintenance	Operating machinery and equipment	Traffic collision, animal collision and leak control	Workers must be trained and authorized to operate machinery and equipment in accordance with national and international occupational health and safety standards. Workers will go through training for defensive driving and fauna care. The practice of checking equipment on a daily basis using a checklist should be implemented. The company must provide all the appropriate personal and collective protective equipment (PPE/CPE) for each type of machine/equipment that will be operated. In the event of leaks or spills, the activity should be stopped, the leak contained, emergency blankets and kits used, and the equipment serviced upon return.
Plantation maintenance	Execution of Operational Practices	Exposure to bad weather (solar radiation, rain, fog, lightning)	All weather protection equipment must be provided, such as raincoats, boots, sunscreen, hats, long-sleeved uniforms, and more. Depending on the weather conditions, the activity should be halted until normality returns. Workers should not be exposed to critical weather conditions (such as heat, heavy rain and lightning). The company must instruct all workers to seek shelter in the event of critical weather conditions.
Plantation maintenance	Execution of Operational Practices	Forest fires	Adopt fire prevention measures, such as proper maintenance of machinery and equipment. Keep an environmental emergency kit near the machines. Provide training for workers on the actions to be taken in the event of forest fires.
Plantation maintenance	Execution of Operational Practices	Being attacked by various animals	Provide all the necessary safety equipment to protect against animals such as snakes, spiders, insects and other wild animals. All workers must be trained on how to act in the event of animal attack.

Project Stage	Activity	Risk Scenario	Control Measure
Manual or mechanized forest harvesting and thinning (eucalyptus/pine)	Operating machinery and equipment	Cutting, crushing parts of the body	Workers must be trained and authorized to carry out the activity. Provide protective gloves resistant to cutting and crushing. Provide workers with suitable tools and advise them not to use damaged tools and/or tools in poor condition and not to improvise tools. Clearly communicate which channel workers should use to request new tools and other work equipments. Workers must be instructed on the following: never to use their hands as a guide for cuts, not to clean tools without wearing protective gloves, not to expose body parts to cutting and crushing points, to keep tools protected and organized when not in use and to check tools before using them, not to service tools without prior knowledge, to use tools properly and only for the right purpose.
Manual or mechanized forest harvesting and thinning (eucalyptus/pine)	Execution of Operational Practices	Being attacked by various animals	Provide all the necessary safety equipment to protect against animals such as snakes, spiders, insects and other wild animals. All workers must be trained on how to act in the event of animal attack.
Manual or mechanized forest harvesting and thinning (eucalyptus/pine)	Execution of Operational Practices	Exposure to bad weather (solar radiation, rain, fog, lightning)	All weather protection equipment must be provided, such as raincoats, boots, sunscreen, hats, long-sleeved uniforms, and more. Depending on the weather conditions, the activity should be halted until normality returns. Workers should not be exposed to critical weather conditions (such as heat, heavy rain and lightning). The company must instruct all workers to seek shelter in the event of critical weather conditions.
Manual or mechanized forest harvesting and thinning (eucalyptus/pine)	Operating machinery and equipment	Traffic collision, animal collision and leak control	Workers must be trained and authorized to operate machinery and equipment in accordance with national and international occupational health and safety standards. Workers will go through training for defensive driving and fauna care. The practice of checking equipment on a daily basis using a checklist should be implemented. The company must provide all the appropriate personal and collective protective equipment (PPE/CPE) for each type of machine/equipment that will be operated. In the event of leaks or spills, the activity should be stopped, the leak contained, emergency blankets and kits used, and the equipment serviced upon return.
Manual or mechanized forest harvesting and thinning (eucalyptus/pine)	Operating machinery and equipment	Forest fires	Adopt fire prevention measures, such as proper maintenance of machinery and equipment. Keep an environmental emergency kit near the machines. Provide training for workers on the actions to be taken in the event of forest fires.
Manual or mechanized forest harvesting and thinning (eucalyptus/pine)	Transportation and loading of eucalyptus	Falling objects	Workers must be trained and authorized to operate machinery and equipment in accordance with national and international occupational health and safety standards. The load and the operating range of the machines must be determined, in order to avoid collisions. Access to operating areas must be restricted to authorized workers; All loads must go through the lashing and stability process before transportation begins.

Project Stage	Activity	Risk Scenario	Control Measure
Manual or mechanized forest harvesting and thinning (eucalyptus/pine)	Transportation and loading of eucalyptus	Traffic collision, animal collision and leak control	Workers must be trained and authorized to operate machinery and equipment in accordance with national and international occupational health and safety standards. Workers will go through training for defensive driving and fauna care. The practice of checking equipment on a daily basis using a checklist should be implemented. The company must provide all the appropriate personal and collective protective equipment (PPE/CPE) for each type of machine/equipment that will be operated. In the event of leaks or spills, the activity should be stopped, the leak contained, emergency blankets and kits used, and the equipment serviced upon return.

9.2.1. General Control Measures

In the course of carrying out the activities and considering the evolution of the project, the risk scenarios may undergo changes relevant to each stage. Therefore, periodic monitoring is of utmost importance to map out all risks in advance and implement control measures before activities begin, thus preventing workers from being exposed to risks and avoiding accidents

It is important to emphasize that if a situation of serious and imminent risk is identified—i.e., a work condition or situation that could cause an accident or illness resulting in serious injury to the worker—activities must be stopped until the situation is under control. Additionally, workers should be made aware of the Right to Refuse Work tool, which is their right to stop or refuse work when they are in a risky situation that jeopardizes their lives or the lives of other workers or people.

A company's health and safety management process must be comprehensive and always comply with national and international standards and legislation, tailored to the location and nature of the operation and the production chain.

Finally, it is important to note that the company already implements an extensive health and safety management process at Project Alpha. This process complies with national and international standards and regulations, considering the location and nature of the operations and the production chain. In addition to the control measures mentioned in item 12.1, the company already implements the following health and safety actions:

1. It has operating procedures with health and safety considerations and precautions for each project activity.
2. It has an Emergency Response Plan that covers all the project's emergency scenarios and accident situations.
3. It promotes safety dialogues at predefined intervals to deepen knowledge of health and safety issues throughout the implementation of activities.
4. It integrates health and safety management into the project, ensuring that all actions related to health and safety comply with applicable standards and regulations.

Note: All control measures are based on a prior analysis of the project context and are constantly evaluated and implemented by qualified occupational safety professionals.

10. ANALYSIS OF THE ENVIRONMENTAL RISKS INHERENT IN IMPLEMENTATION AND OPERATION

This section aims to summarize the risks inherent in the implementation and operational stages considering Project Alpha. The focus is solely on the main risks associated with the various activities practiced on a Forestry Farm.

It's important to note that, in Brazil, the distinction between environmental risk and environmental impact is well-defined. Environmental impact is connected to the routine activities carried out by the enterprise, encompassing all its environmental aspects (which can be seen as ‘factors or elements contributing to environmental impact’). Environmental impact is any change that occurs in the environment due to natural causes or human action. An environmental aspect, in turn, is the element that generates the environmental impact. The identification of environmental aspects often considers, for example, air emissions, water and soil releases, raw material use, waste and natural resources. On the other hand, environmental risk is inherently tied to an unforeseen situation in the regular operation of the enterprise, typically associated with an event classified as an incident or accident.

For instance, a fuel tank leak is an event categorized as an environmental risk because it is evidently an unforeseen incident in the project’s operation. The same rationale can be applied to events such as fires or accidents involving machinery.

Conceptually, it is defined that:

- Risk is defined as the identification of events or potential events stemming from operational factors that have the potential to generate an impact on the environment, distinct from environmental aspects, as previously explained. Moreover, these events may also pose a risk to the company’s business, which could include operational disruptions or legal issues. They can be characterized by the following scenarios:
  - Arising from the occurrence of an operational risk within the company, such as the release of hazardous substances, oil spills, wildfires, explosions, and workplace accidents, including incidents involving vehicles and machinery.
  - Emanating from external sources independent of the company’s primary operations, which have the potential to result in environmental consequences and operational disturbances. These sources encompass concerns like deliberate forest fires, fires caused by equipment malfunctions, and challenges linked to the supply chain.

10.1. METHODOLOGY FOR RISK ANALYSIS

In conducting the risk analysis, the Tetra Tech team reviewed the documents provided by the company and conducted field surveys. During this process, the team documented findings that could potentially lead to instances of non-compliance with environmental regulations, environmental liabilities, process deviations, and other factors that could result in environmental damage or adversely impact the company's reputation as an unintended consequence. All of these findings have the potential to generate environmental impacts associated with accidents, incidents, operational and/or management non-compliance.

The findings have been summarized in the table below, outlining various concerns and observations.

Table 10-1- Record of Findings

STATUS/DIMENSION:		**Finding No. X**
SEVERITY:		
PROBABILITY:		
FINDING		
RELATED CONCERNS		
NOTES/RECOMMENDATIONS		

The findings have been categorized using the Risk Matrix, which combines the concepts of **severity and probability** to determine the magnitude of the risks. This evaluation criterion helps identify 'Red Flags,' 'Yellow Flags,' and 'Green Flags.' The severity concept assesses the degree of impact that might result from the realization of risks in various dimensions and areas of activity, including environmental and legal aspects. The probability concept gauges the likelihood and frequency of potential risk realization.

The definitions of severity are outlined in **Table 10-2**.

Table 10-2 - Severity of the Impact

SEVERITY/ DIMENSION	DESCRIPTION	
	SOCIAL-ENVIRONMENTAL	LEGAL
HIGH	High-magnitude environmental impact, with municipal reach and/or extending to surrounding areas, which requires the mobilization of internal and/or external resources, repair and/or compensation measures to mitigate the negative effects.	Situation with potential to cause interference from Regulatory Agency or Judicial Bodies, with the appellants having commitments to the Public Prosecutor's Office (MP) and other institutions (Conduct Adjustment Agreement - TAC, Environmental Compliance Agreement - TCA). Partial or total interdiction of operations.
MEDIUM	Medium-magnitude environmental impact, with local or adjacent coverage, which requires simple control measures and/or the mobilization of internal resources to minimize negative effects.	Administrative penalty of a warning with a fine. Local repercussions (within the municipality) involving government authorities.
LOW	Low-magnitude environmental impact risk, which requires simple control measures to minimize negative effects. The affected environment does not lose its integrity (composition, structure, and functions).	Possible warning without a fine. Limited repercussions (in the neighborhood)

The impact caused by the risk is evaluated in both dimensions (Socio-environmental and Legal aspects), and the most critical result is utilized. The classification of the probability of occurrence is as follows, shown in the chart below**.**

Table10-3 - Probability Chart

DESCRIPTION	DENOMINATION
LIKELY	Event that has already occurred or that will certainly occur within the existing environmental information.
POSSIBLE	Possible event to occur. Feasible. Not designated as probable nor unlikely.
REMOTE	Unlikely to occur in similar facilities or in similar known cases.

The Risk Matrix presented below is the combination of the probability and severity of the events distributed on their respective scales. According to its quadrant in the Risk Matrix, each finding will have its risk classification and priority classified as High, Medium, or Low. In other words, the Environmental Risk classification is determined by the ratio of Severity *versus* Probability.

Table10-4 - Risk scenarios and respective control measures

Environmental Risk Matrix		*Severity*		
		Low	**Medium**	**High**
Probability	**Likely**	*Yellow Flag*	*Red Flag*	*Red Flag*
	Possible	*Green Flag*	*Yellow Flag*	*Red Flag*
	Remote	*Green Flag*	*Green Flag*	*Yellow Flag*

To provide the environmental risk analysis in this section, we use photographic records taken during Tetra Tech's technical inspection, as well as reference other documents containing related content.

10.1.1. Environmental risk analysis in compliance with preventive and mitigation measures and actions

This document reclassifies the assessed Environmental Risks, considering the utilization of measures already established by the company. This reclassification is presented in a separate section, following the analysis of each impermissible Environmental Risk.

10.2. ENVIRONMENTAL RISK ANALYSIS

After analyzing the existing documentation, conducting on-site work, and completing this socio-environmental impact assessment study, the identified environmental risks were summarized in the following schematic tables, presenting the related concerns and observations.

Based on the scenario, three findings/situations that generate environmental risks were identified for the company considering Project Alpha. The following schematic tables display the registration and analysis of the findings and the risks involved for each theme

It is important to point out that the socio-environmental risks reported here should be understood as the main categorized risks. Other risks are reported throughout this document, such as the risks of accidents involving **HSE** (Health, Safety, and Environment) issues, referenced in **Chapter 9** of this environmental assessment.

10.2.1. Fire

Fire may occur around or even inside Project Alpha's forest stands due to the following causes:

- Natural Fire: When fire originates from natural phenomena, regardless of human action. Among the main causes are electrical discharges caused by lightning strikes and spontaneous combustion of cotton fibers, chemicals, or gunpowder.
- Accidental Fire: When fire is caused by unintentional human action, such as the disposal of lit cigarette butts, spontaneous ignition of dry grass from sunlight, fire balloons/sky lanterns, out of control prescribed burns for agriculture, fire spread from unattended bonfires, accidents involving vehicles with explosion and fuel burning, among other situations.
- Deliberate Fire Setting: Caused by intentional human action, when an individual purposely sets fire to a certain stretch of forest, without agricultural objectives or any plausible reason to justify it.
- Fire due to defective Transmission Line Operation: A transmission line crosses part of the property of Project Alpha. Maintenance for this transmission line is required to prevent or reduce the risk of fire outbreaks. The ignition of a fire is deemed to commence when a tower or cable collapses, often due to issues like inadequate maintenance of the foundations, erosion, cable deterioration, etc., accompanied by electrical discharges that have the potential to ignite nearby dry vegetation.

In the event of nearby fires, the transmission line may enhance the fire's power. Even if the flames don't directly intercept the cables, they can cause short circuits due to the electrical charge produced by the heat in the ionized field around the wires, generating a cascade effect. This scenario also creates new impacts, such as the interruption of the power supply, halting of the project's operations, and blocking of access roads for safety reasons

Given the importance and sensitivity of the topic, this environmental risk is considered to be of high severity. Considering the range of possible causes, it is classified as possible. Additionally, it poses a high-magnitude environmental impact with municipal reach and/or extending to surrounding areas, and there is the possibility of total interdiction of operations.

Table 10-5 – Environmental Risk Record – FIRE

STATUS/DIMENSION:	*Fire*	**Risk No 1 Fire RED FLAG**
SEVERITY:	**HIGH**	
PROBABILITY:	**POSSIBLE**	
FINDING		
Natural and anthropogenic context presents potential for the occurrence of fires.		
RELATED CONCERNS		
Project Alpha may be susceptible to fires caused by natural or accidental reasons, set deliberately, or caused by the faulty operation of the transmission line. The potential impact of this environmental risk is associated with serious environmental and social problems. The occurrence of fires in large areas can lead to catastrophic scenarios, including the elimination of species of fauna and flora, damage to the soil, and the possibility of affecting surrounding communities and properties. Additionally, there is a risk of loss of life.		
RECOMMENDATIONS		
Adopt preventive and firefighting measures, such as: - Implementing and maintaining firebreaks, ensuring adequate maintenance of machinery and equipment, positioning fire extinguishers in strategic locations, improving firefighting equipment, implementing protective devices and/or barriers to prevent access to fuel and chemical storage areas, and periodically reassessing scenarios and procedures through the institution of an emergency plan to be periodically updated. - Maintaining an environmental emergency kit close to the operation of the machines, training workers in the actions to be taken in case of forest fires, including forming a team of firefighters, conducting periodic training and simulations considering the worst possible scenario. Using a computerized system for uninterrupted monitoring of fire outbreaks, as already implemented by the company. - Establishing a permanent outsourced surveillance service aimed at maintaining a strong presence and supervisory action to inhibit or prevent criminal actions and/or infractions against the pine and eucalyptus plantation areas and nature reserves. - Establishing a trained firefighting brigade and forming partnerships with companies in the region, members of ‘Reflore’ (the Association of Planted Forest Producers in Mato Grosso do Sul), rural producers, and companies in the forestry production chain who maintain permanent action to prevent forest fires and have a structure.		

As summarized in the chart, this environmental risk – FIRE – falls into the RED FLAG category, and is the worst possible environmental risk assessed for the company’s project at Project Alpha.

➢ **Application/Implementation of Preventive and Mitigation measures for Fire Hazard**

At present, the company already implements some fire protection measures such as those listed above. These measures are established by the company's Work Instructions such as:

- ISI 004 – Forest Protection
- ISI 014 – Implementation and Maintenance of Roads and Firebreaks
- ISI 016 – Fuel Storage and Supply, among other instructions.

It is worth mentioning that the company has a robust computerized system for monitoring and preventing fire outbreaks. The monitoring system enables 24-hour surveillance of Project Alpha, operated uninterruptedly by employees, as well as having a direct connection reporting system and satellite monitoring. **Figure 10.1** below illustrates one of the hubs of this online monitoring system.

Figure 10-1 – Monitoring center against fire outbreaks.



This robust computerized fire monitoring system has a series of measures to adopt in the event of fire outbreaks. These measures do not reduce the severity of the environmental risk from fires but actually qualify it. This aligns with the definitions of high-severity risks from both socio-environmental and legal perspectives:

> *"High-magnitude environmental impact, with municipal reach and/or extending to surrounding areas, which requires the mobilization of internal and/or external resources, repair and/or compensation measures to mitigate the negative effects"; and*

"Situation with potential to cause interference from Regulatory Agency or Judicial Bodies, with the appellants having commitments to the Public Prosecutor's Office (MP) and other institutions (Conduct Adjustment Agreement – TAC, Environmental Compliance Agreement – TCA). Partial or total interdiction of operations".

The analysis conducted above consIders the risk of a high-magnitude environmental impact caused by fires, an issue that intrinsically has the potential to cause significant damage to the environment and communities and requires the mobilization of internal and/or external resources to manage the risk.

However, it should be noted that the actions taken by the company, notably the computerized system for uninterrupted (24-hour) monitoring of fire outbreaks, combined with the list of response measures already established to combat the outbreak of conflagrations, have led to a reassessment of the likelihood of large fires occurring. This facilitates firefighting as soon as they are detected, making the likelihood of fires occurring remote.

In view of the above, we revise the Environmental Risk classification as follows.

Table 10-6 – Environmental Risk Record – FIRE with mitigation measures

STATUS/DIMENSION:	*Fire*	**Risk No 1 Fire YELLOW FLAG**
SEVERITY:	**HIGH**	
PROBABILITY:	**REMOTE**	

10.2.2. Leaks and Spills

Leaks and/or Spills may occur at Project Alpha due to the following causes (but not limited to them):

- Improper maintenance of vehicles, machinery, and equipment, leading to fluid leakage during machine operation.
- Mistakes in the procedures for transport, storage, and handling of chemicals.
- Inadequate storage of chemicals, waste, fuels, and equipment, among others.

During the technical inspection carried out by the Tetra Tech team at Project Alpha, some non-conformities were found regarding the management and handling of waste, products and equipment with potential for leaks and spills that could cause soil and water resources contamination.

This risk is classified as low severity because spills/leaks are confined to the immediate area of the incident and lead to a specific environmental impact that can be mitigated through straightforward control measures.

Conversely, when considering this issue within the context of current operations, it reveals a persistent presence of non-compliance issues in the established controls and procedures at Project Alpha. This recurrence continues even though the company has already adopted all the procedures recommended in this study, as detailed in the chapter on Environmental Programs, particularly in the Solid Waste and Chemicals Management Program. Consequently, this type of incident is categorized as likely to occur.

Table 10-7- Environmental Risk Record – LEAKS and SPILLS

STATUS/DIMENSION:	*Leaks and Spills*	**Risk No 2 Leaks and Spills YELLOW FLAG**
SEVERITY:	**LOW**	
PROBABILITY:	**LIKELY**	
FINDING		
Verification of nonconformities regarding the management of chemicals, waste, and fuels, in addition to the incorrect parking of vehicles.		
RELATED CONCERNS		
Project Alpha must fully comply with procedures for handling potential sources of leaks or spills of contaminating substances. Failure to observe good practices in this regard may result not only in environmental contamination but also in notification of the company by the corresponding public authority or entity.		
RECOMMENDATIONS		
Adopt preventive measures regarding the possibility of leaks or spills, based on good environmental management practices, such as: - Provide adequate storage/disposal for equipment, products, and waste according to the company's Procedures as provided in this document. - Promote the waterproofing of the floor in areas with products and equipment susceptible to oil leaks. - Pave parking areas. - Implement containment basins around equipment and implements. - Make the MSDS of the chemicals available accordingly. - Properly store products and waste in covered areas. - Conduct proper waste handling and segregation. - Train employees engaged in waste/product management activities. - Avoid fuel and hydraulic oil leaks, which can contaminate the soil and water. Machines must undergo routine preventive maintenance to inspect the condition of hoses, connections, tanks, and filters. - If a leakage occurs, promptly stop the machine or vehicle, and position a containment device beneath the point of leakage.		

- Remove and transport contaminated soil to an appropriate disposal site, and replace any hydrocarbon-contaminated parts. - Store products in dedicated warehouses equipped with a roof, impermeable flooring, and walls that prevent the entry of animals or unauthorized individuals. - Wear personal protective equipment (PPE) during handling to prevent any risk of intoxication, and dispose of used PPE as hazardous waste. - Treat empty packaging from agrochemicals as hazardous waste and properly dispose of them. - Verify the correct disposal method with the company, following the procedures outlined in the Solid Waste and Chemicals Management Program (PGRSGPQ). - Ensure compliance with all other practices related to this subject, as outlined in the company's Work Instructions and in the Solid Waste and Chemicals Management Program (PGRSGPQ).

This environmental risk is categorized as a YELLOW FLAG, indicating it is initially associated with limited environmental impacts. However, if proper procedures for storage, use, transport, handling, and final disposal are not followed, the risk of spills or leaks can lead to persistent environmental issues, negatively affecting both the company's image and reputation. Hence, despite its relatively low severity, attributed to its occasional occurrence, it is imperative to maintain vigilance in order to minimize and ideally prevent any nonconformities related to this issue.

➢ **Application / Implementation of preventive and mitigation measures for Leaks and Spills**

The measures on the subject have been summarized in the table above. In addition, it is worth listing the the company's Work Instructions, which list procedures, measures, and management guidelines that directly address the subject:

- IMA 001 – Waste Disposal
- IMA 002 – Leakage Control
- IMA 003 – Soil and Water Conservation
- IMA 004 – Natural Ecosystems
- IMA 005 – Environmental Liabilities
- IMA 006 – Use of Water and Electricity
- IMA 007 – Water Resources Monitoring
- IMA 008 – Injured and Deceased Fauna Monitoring
- ISI 001 – Planting and Replanting
- ISI 002 – Soil Preparation
- ISI 003 – Carving and Coppicing
- ISI 004 – Forest Protection
- ISI 005 – Adubation

- ISI 006 – Water Collection
- ISI 007 – Termite Control
- ISI 008 – Invasive Weed Evaluation
- ISI 009 – Ant Control
- ISI 010 – Irrigation
- ISI 011 – Area Cleaning
- ISI 012 – Invasive Weed Control
- ISI 013 – Washing PPE used in Agrochemical Application
- ISI 014 – Implementation and Maintenance of Forest Roads and Firebreaks
- ISI 015 - Washing, Disposal, and Return of Agrochemical Packaging
- ISI 016 - Fuel Storage and Supply
- ISI 017 - Coppicing
- ISI 018 - Storage of Inputs and Agrochemicals
- ISI 019 - Environmental and Social Risk Analysis (ARAS) for Agrochemicals
- ISI 020 – Extraction of Road Maintenance Material
- ISG 001 – Registration and Mapping
- ISG 002 – Purchase of Seedlings
- ISG 003 – Microplanning
- ISG 004 – Property Security
- ISG 005 - Timber Marketing
- IMM 001 - Vehicles, Machinery and Equipment Inspection
- IMM 002 - Washing Machinery and Equipment
- ICO 001 – Forest Harvesting
- ICO 002 – Chain of Custody
- ICO 003 – Removal of Exotic Species in Protected Areas
- ICO 004 – Wood Wasp Control and Monitoring
- ICO 005 – Pile Measurement and Wood Shipping
- ICO 006 – Forestry Transport
- ICO 007 – Forestry Loading
- ICO 010 - Wood Chipper and Transport of Wood Chips
- IST 001 – Nutrition
- IST 002 – Sector Inspections
- IST 003 – Water Potability

In addition, it is worth mentioning some specific topics that deal with the management of chemicals and solid waste that are being complied with by the company, such as:

- Sustainable Use of Agrochemicals: the company has strict regulations and sustainable practices on the use of agrochemicals, such as glyphosate and sulfluramid, and minimizes their use whenever possible.
- Waste and Effluent Management: the company implements appropriate solid waste and effluent management practices, including the correct handling of packaging, utilization of suitable parking spaces, and adequate procedures for the maintenance and refueling of machinery, equipment, and vehicles, which are carried out outside Project Alpha in appropriate workshops.
- Environmental Education: the company conducts environmental education programs to raise awareness among employees about the importance of responsible use of chemicals and proper handling of solid waste.

In short, if all procedures and techniques for storing, using, transporting, handling, disposing of, and managing products and waste are complied with, the environmental risk of spills/leaks is controlled in terms of its impact on the environment and the company's image and reputation. Therefore, considering the achievement of compliance on this subject, the likelihood of episodes for this environmental risk becomes remote.

In view of the above, we revise the Environmental Risk classification as follows.

Table 10-8- Environmental Risk Record – LEAKS and SPILLS with mitigation measures

STATUS/DIMENSION:	*Leaks and Spills*	**Risk No 2 Leaks and Spills GREEN FLAG**
SEVERITY:	**LOW**	
PROBABILITY:	**REMOTE**	

10.2.3. Reputational Risk

In summary, Reputational Risk for the company is linked to the company's interactions with local residents and communities. This risk can arise from the outcomes of operational incidents such as fires or improper chemical management, as well as from ineffective communication that fosters negative perceptions among the local population, including nearby farmers. Furthermore, the company must establish and maintain fair and productive relationships with government entities and regulatory bodies in both social and environmental domains.

Another issue that could impact the company's reputation is the discovery and public disclosure of any legal violations committed by the company.

It's important to highlight that the company's reputational risk is closely connected to the performance of its entire supply chain, encompassing aspects related to productivity, operations, environment, social responsibility, labor practices, and occupational health. As an example, if a human rights violation occurs within any of Project Alpha's suppliers and becomes public knowledge, the potential harm to the company's reputation is substantial.

Considering the sensitivity of the issue and the potential impact at the local and municipal levels, the severity of this socio-environmental risk is assessed as medium. Given the company's historical commitment to environmental responsibility, community engagement, respect for human rights, and compliance with international legal standards, it's worth noting that controversies related to Reputational Risk, even those involving subcontractors, have a low likelihood of occurring.

Table 10-9- Social and Environmental Risk Record – REPUTATIONAL RISK

STATUS/DIMENSION:	*Reputational Risk*	**Risk No 1 Reputational Risk GREEN FLAG**
SEVERITY:	**MEDIUM**	
PROBABILITY:	**REMOTE**	
FINDING		
Considering the possibility of unforeseen incidents like fire and product spills, as well as the environmental impacts outlined in Chapter 8.0 of this document, it is evident that maintaining open communication with the local community and neighboring businesses, along with thorough oversight of subcontractors, is imperative. Furthermore, it is essential to establish and maintain communication with governmental and regulatory authorities, ensuring adherence to the actions, measures and procedures in alignment with legal and international standards.		
RELATED CONCERNS		
The company aims to be an international reference in the fight against climate change at Project Alpha. To ensure the success of the project, it is vital to maintain positive relationships with local businesses, nearby communities, and government authorities. In a hypothetical scenario where environmental impacts occur without proper controls, stemming from operational risks or procedural errors—such as fires, legal violations by subcontractors, and various other environmental factors and associated risks—there is a potential vulnerability to the dissemination of damaging information about the company. This information may be subject to distortion or unfavorable promotion, thereby affecting the company's image and reputation.		
RECOMMENDATIONS		
- Be vigilant about the outcomes of all environmental programs and identify potential reasons for non-compliance. - Ensure the continuous operation of the fire prevention and firefighting system and maintain coordination with neighboring projects. - Implement the measures of the socio-economic programs with a focus on monitoring and improving the quality of the outcomes.		

- Adhere to all the practices, actions, and procedures outlined in the environmental programs of this environmental study, as well as in the company's Work Instructions, and incorporate the guidelines set forth by the IFC's Performance Standards and Equator Principles.
- Establish and maintain a subcontractor management system to prevent non-compliance issues with all suppliers operating at Project Alpha.
- Execute a Corporate Communication Program.

10.3. CONSIDERATIONS

When assessing the implementation and operation of the project, a brief analysis reveals the presence of three correlated socio-environmental risks. These encompass 1 ***Red Flag risk,*** 1 ***Yellow Flag*** risk, and 1 ***Green Flag*** risk, as indicated in the table below, which outlines the identified risks and their respective category.

Enterprise	Risk / Finding	Risk Classification
Project Alpha	**Fire**	***RED FLAG***
	Leaks and Spills	YELLOW FLAG
	Reputational Risk	GREEN FLAG

On the other hand, taking into account the mitigation measures (preventive, control, response, and management procedures), and considering their application as fully implemented and successful, the socio-environmental risks mentioned above are reclassified as 1 Yellow Flag risk and 2 Green Flag risks, as follows.

Table 10-10– Risk Classification with Mitigation Measures

Enterprise	Risk / Finding	Risk Classification with Mitigation Measures
Project Alpha	Fire	***YELLOW FLAG***
	Leaks and Spills	***GREEN FLAG***
	Reputational Risk	***GREEN FLAG***

Contrarily, the Environmental Risk labeled '*Fire'* demands the highest level of vigilance and action from the maintenance personnel, employees, and all workers associated with this enterprise throughout its operational lifespan. This heightened attention is warranted due to the potentially catastrophic outcomes that a forest or vegetation fire in the vicinity can inflict on entrepreneurs, neighboring residents, local communities, populations, and the environment at large. It encompasses the critical consideration of both the physical and biological aspects of the environment.

11. PROPOSED ENVIRONMENTAL AND SOCIAL PREVENTION AND MITIGATION MEASURES

The company sought to develop the technical instructions for the activities, including ways to mitigate or reduce the impacts generated during the operation. Below is a sequence of activities outlined in the technical instructions.

Technical Instructions ISI 001 (Planting and Replanting), ISI 010 (Irrigation), and ISI 011 (Area Cleaning):

1. Operators are trained in personal protective equipment (PPE) and its correct use in various activities.
2. There is an instruction not to dispose of garbage in the workplace. Garbage must be collected at the end of the day and sent to the correct disposal in their respective containers. As for organic waste material (food scraps, fruit peelings, etc.), it should be disposed of in appropriate trenches with a suitable depth (at least 50 cm) and covered after disposal, which is considered an advantageous practice for the environment. This technique offers several benefits, such as nutrient recycling, where the buried organic material is decomposed by microorganisms, releasing nutrients that return to the soil, enriching it and increasing its fertility. In addition, decomposing organic matter contributes to the formation of humus, which improves the soil's structure, increasing its water retention capacity and porosity. Another benefit is carbon sequestration, as the carbon present in buried organic material is retained in the atmosphere, helping to mitigate climate change. Finally, soil rich in organic matter is a favorable environment for the proliferation of microorganisms and other beneficial organisms, increasing soil biodiversity.
3. Technical guidance is provided on the safety measures in handling insecticides, including recommendations on the correct dosage and proper disposal of leftover syrups with insecticides.
4. Another aspect addressed is the importance of adjusting fertilizer to provide the precise amount, thereby avoiding soil pollution with excess fertilizers.
5. The operating speed of the equipment is also indicated to ensure the effectiveness of fertilizer application.
6. Guide on precautions when carrying out the activity, in terms of respecting distances from reserve areas and water abstraction in authorized places, are provided.
7. All water abstraction must be recorded in the Water Abstraction Control form (FSI 006.04);
8. Warnings about the need to remove the soil in case of insecticide spillage are provided.
9. Discuss how to properly dispose of empty chemical packaging.
10. Discuss the situation of diesel leaks in machines and equipment, advising on the use of bags to collect contaminated soil for later disposal.

Technical Instructions ISI 002 (Soil Preparation), ISI 003 (Forest Stand Delineation), and ISI 014 (Implementation and Maintenance of Roads and Firebreaks):

1. Advise on the need to use and maintain the PPE.
2. There are recommendations related to diesel leakage. The contaminated soil should be removes and sent to storage and final disposal.
3. Do not dispose of garbage in the workplace. Garbage must be collected at the end of the day and sent to the correct disposal in their respective containers. As for organic waste material (food scraps, fruit peelings, etc.), it should be disposed of in appropriate trenches with a suitable depth (at least 50 cm) and covered after disposal.
4. Advise not to enter reserve areas and Permanent Preservation Area (APP).
5. During the forest stand delineation, the operator is instructed to turn over the soil layer as little as possible.
6. Whenever possible, planting rows should be made parallel to the level curves, seeking to position the rows perpendicular to the terrain's unevenness. It aims to dissipate the water energy and reduce potential issues related to erosion in the future.

Technical Instructions ISI 004 (Forest Protection), ISI 009 (Ant Control), and ISI 012 (Crop-Weed Competition Control):

1. Indicate the need to wear PPE while applying insecticides.
2. Indicate the favorable weather conditions for applying insecticides and the best times of the day to avoid product drift.
3. Indicates the need to carry out triple-rinsing and the disposal of contaminated packaging. Forbids the use of chemicals prohibited by certifying and supervisory agencies.
4. Do not dispose of garbage in the workplace. The garbage must be collected at the end of the day and sent to the correct disposal in their respective containers. As for organic waste material (food scraps, fruit peelings, etc.), it should be disposed of in appropriate trenches with a suitable depth (at least 50 cm) and covered after disposal.
5. It is also prohibited to fill and rinse tanks in water supply areas.
6. All water abstraction must be recorded in the Water Abstraction Control form (FSI 006.04);
7. Guidelines regarding diesel leaks are provided; avoid preparing insecticides near reserves and Permanent Preservation Areas.
8. Guidelines against forest fires explicitly state the need to fight fires in the reserves and Permanent Preservation Areas.
9. Water abstraction for emergency firefighting situations is exempt from license and DURH (Declaration of Water Resources Use).

Technical Instruction ISI 013 (PPE Washing):

1. Instruction to wash the PPE separately.
2. The rinsing water must be used to apply agrochemicals in the field.

Technical Instruction ISI 005 (Fertilizer Application):

1. Indicates the need to wear PPE and to remove the soil that may be contaminated with diesel, and interrupt the use of the equipment.
2. Do not dispose of garbage in the workplace. The garbage must be collected at the end of the day and sent to the correct disposal in their respective containers. As for organic waste material (food scraps, fruit peelings, etc.), it should be disposed of in appropriate trenches with a suitable depth (at least 50 cm) and covered after disposal.
3. Provide guidance on the need to adjust the machine to avoid excessive use of fertilize.
4. Gauge the weighing equipment (scales).

Technical Instruction ISI 006 (Water Abstraction):

1. Provides guidance on the need to avoid fuel, oil, or chemicals leaks.
2. Interrupt activities when there is an oil leak in the equipment.
3. Do not dispose of garbage in the workplace. The garbage must be collected at the end of the day and sent to the correct disposal in their respective containers. As for organic waste material (food scraps, fruit peelings, etc.), it should be disposed of in appropriate trenches with a suitable depth (at least 50 cm) and covered after disposal.
4. Emphasizes the need to keep equipment and trucks in perfect condition, reducing excess vibrations, noise, and leaks.
5. During the water abstraction operation, actions must be taken to minimize impacts on fauna and flora.
6. Allows water abstraction only with a license for the site or the Declaration of Water Resources Use (DURH) in the case of the state of Mato Grosso do Sul.
7. In authorized places without water flow, water abstraction should not be carried out.
8. During water abstraction, handling of agrochemicals is not allowed, nor is the use of agrochemical tanks for water abstraction. Care must be taken to prevent water leaks during abstraction.
9. All water abstraction must be recorded in the Water Abstraction Control form (FSI 006.04).
10. Any environmental incident/accident that spills hazardous substances into water resources must be handled according to the Emergency Preparadness and Response procedure.

Technical Instruction ISI 016 (Fuel Storage and Supply):

1. When refueling equipment, due care must be taken to avoid fuel, oil, or chemicals leaks.
2. Do not continue activities when there is an oil leak in the equipment.
3. If the soil is contaminated by a spill, remove the soil and place it in a bag for disposal.
4. The refueling truck is not allowed to travel within Permanent Preservation Areas or Legal Reserves.
5. Do not start any activities in the area before the environmental license/DCC is granted (when applicable) and the Preliminary Risk Analysis (PRA) is carried out;
6. Do not dispose of garbage in the workplace. The garbage must be collected at the end of the day and sent to the correct disposal in their respective containers. As for organic waste material (food scraps, fruit peelings, etc.), it should be disposed of in appropriate trenches with a suitable depth (at least 50 cm) and covered after disposal.
7. Only use equipment that has a specific environmental license issued by the competent agency.
8. Emphasize the need to keep equipment and trucks in perfect condition, reducing excess vibrations, noise, and leaks.
9. Refueling must be carried out carefully to avoid generating risks of leaks and explosions.
10. No storage or mixing of fuels, oils, chemicals, or similar substances may be carried out in areas where a deliberate or accidental discharge may reach any body of water.

Technical Instruction ISI 018 (Storage of Inputs and Agrochemicals):

1. Requests the use of PPE to carry out the control and handling of dangerous products.
2. It indicates that storage should occur away from bodies of water and in locations where there are no ignition sources that could cause fires.
3. Storage should not be done directly on the ground; it should always be on pallets.
4. In case of leakage, the activities must be immediately interrupted.
5. Do not dispose/throw debris/garbage in legal reserves, permanent preservation area, or the work site. The garbage must be collected and disposed of in the proper location. As for organic waste material (food scraps, fruit peelings, etc.), it should be disposed of in appropriate trenches with a suitable depth (at least 50 cm) and covered after disposal.

In addition to the technical instructions mentioned above, there are also instructions for the Management Program:

- PG004, Identification of Aspects, Hazards, and Impacts, and Risk Assessment: Presents the systematization to identify aspects and hazards, assess impacts and risks of services, activities, and products on the company properties, and defines management strategies.

- PG005, Plan for Identification and Management of High Conservation Value Attributes: Systematizes the identification and management of attributes of areas considered as High Conservation Value (HCV) areas.
- IMA 007, Monitoring of Water Resources: Seeks to understand the dynamics of river basins and forestry activities to establish a monitoring methodology that allows the planning of actions to prevent and mitigate impacts on water resources resulting from forestry operations
- IMA 003, Soil and Water Conservation: Aims at soil conservation through the construction of structures adjacent to roads and firebreaks (such as containment basins, sediment catchment ditches, and ridges), preventing erosion and siltation in the water bodies.

12. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING FRAMEWORK - ENVIRONMENTAL PROGRAMS

12.1. PHYSICAL ENVIRONMENT

This section lists the measures and actions that must be taken in order to prevent, control, and mitigate the environmental impacts described for the physical environment. These are reported in the Environmental Programs; however, it is important to note that the company already has several Work Instructions for the Environment (IMAs) that list measurements and requirements. For example, procedures for the allocation and maintenance of roads, access routes, and firebreaks, as well as the list of parameters that must be monitored in water resources aimed at identifying chemical components of the products used.

The other instructions, such as Harvest Instructions (ICO), Machine Instructions (IMM), Management System Instructions (ISG), Forestry Instructions (ISI), as well as Work Safety Instructions (IST), also have contents correlated to the protection of the physical environment. These documents are referenced due to the measures already listed by the company in its projects, which must be complemented and/or reinforced with the measures and procedures proposed herein, integrated with the monitoring determined by the Environmental Programs.

Likewise, it should be noted that all Environmental Programs presented in this document – (i) Surface and Groundwater Qualitative and Quantitative Monitoring Program, (ii) Erosion Control and Monitoring Program, and (iii) Solid Waste and Chemicals Management Program – are in compliance with applicable laws and regulations. Their implementation must meet the requirements and procedures set forth by IFC's Environment, Health and Safety (EHS) guidelines and specific EHS guidelines for Forest Harvesting Operations, in compliance with those expressed by IFC's Performance Standards 3 and 4.

Performance Standard 4 deals with requirements for 'Community Health, Safety, and Security' while Performance Standard 3 is entitled 'Resource Efficiency and Pollution Prevention.' It lists, among others, requirements related to water consumption, pollution prevention, waste and hazardous materials management, and agrochemical use and management.

12.1.1. Environmental Management Plan for the Implementation and Operation of Forestry at Project Alpha

12.1.1.1. Presentation

The Environmental Management Plan for the Implementation and Operation of Forestry at Project Alpha aims to present the guidelines and orientations for the farm regarding the procedures to be followed during the implementation and operation of the enterprise. These rules and guidelines also apply to the entire supply chain related to Project Alpha's operations. It is highlighted here that these guidelines must be followed by the supply chain even outside the limits of Project Alpha and must be incorporated into its routine performance.

Thus, the program presents measures to be taken in order to preserve the environmental quality of the affected areas and to minimize potential impacts on workers, watercourses, fauna, flora, and surrounding communities.

12.1.1.2. Objectives and Justification

The main objective of this Plan is to implement a work philosophy that avoids and minimizes the incidence of negative environmental impacts resulting from the enterprise, through guidelines and orientations to be followed. The environmental requirements imposed by the legislation in force require the enterprise to intensively monitor the work to prevent, control, or correct any unforeseen events that may arise during the work.

Thus, the development and implementation of the Environmental Management Plan is justified so that the project is implemented based on the best-established environmental practices, allowing rehabilitation and environmental protection measures to be effectively applied.

This Environmental Management Plan will provide the companies responsible for implementing the project with the environmental criteria and procedures to be adopted during the implementation of the stands, as well as in their operation. It will be up to the contracted companies to reconcile the activities related to the implementation of the work with control actions and environmental mitigation measures, ensuring the minimization of the potential impacts foreseen in this stage.

12.1.1.3. Methodology

To ensure the implementation of this Environmental Management Plan, the entrepreneur must incorporate guidelines into the contracts to be signed with the companies responsible for civil construction and supervise the adherence to these contracts. The topics and control measures inherent in this Environmental Management Plan are related to the implementation and operation of the enterprise, and its employees and suppliers are subject to periodic audits and inspections.

A. General Specifications for Contractors

All categories of activities must comply with the respective Regulatory Standards (NRs) approved by Ordinance No. 3.214/78, Chapter V, Title II, of the Consolidation of Labor Laws related to Occupational Health and Safety.

The contracted companies will be obliged, by virtue of a contract, to comply with the Policy, Standards, and Internal Procedures of Quality, Environment, Health, and Safety recommended by the company in its Social and Environmental Management Manual, which reserves the right to carry out, at any time, inspections and audits related to the allocated personnel and the facilities in use, as well as to the documents pertinent to compliance with legislation.

The reports of these audits/inspections will be presented and discussed in meetings with those in charge of the contracted companies, during which corrective actions, responsibilities, and deadlines for rectifying the irregularities pointed out will be defined.

B. Vegetation Cleaning Activities

Vegetation cleaning will be implemented in order to control and minimize the expected impacts on the flora. Actions will be proposed to guide the activities of cleaning the terrain, including cutting down and removing the trees, and restricting the cleaning of vegetation to the strictly necessary areas, without covering native forest vegetation. The areas that will be suppressed must be demarcated in advance to prevent suppression in places outside the project area.

Vegetation cleaning activities will be accompanied by technicians trained in wildlife management, who must carry out actions to remove these animals to adjacent natural areas beforehand and to verify the existence of species of fauna that can be relocated.

The vegetation cleaning monitoring activities in the Directly Affected Area (DAA) will be performed by a specialized technical team. The details of these actions are presented in the **Wildlife Removal and Possible Rescue Program.**

C. Erosion Control

Especially during the implementation phase, a period in which the soil is exposed, erosion and siltation control is a crucial step in the areas where soil movement activities are carried out.

Soil exposure is the main cause of erosion and siltation of natural watercourses, triggered by rainfall and uncontrolled runoff over the areas.

The implementation of control actions must be immediate upon soil exposure, with the primary action being the coverage with vegetative soil. Increasing vegetative cover will only be possible once the earthworks are completed. Until a new vegetation cover can be established, erosion control systems such as (i) constructing low-slope drainage channels (at level); (ii) applying plant litter cover; and (iii) building energy dissipators must be employed.

In specific areas of small extent where erosion emerges due to the lack of vegetation cover, covering the exposed soil with plant debris such as mulch, tree bark, and pruning debris can be used. This manual work aims to minimize the erosion processes by reducing the impact energy of raindrops on the ground.

D. Water Supply System

Water for human consumption will be supplied through a groundwater abstraction license. Water used for irrigation will be sourced from surface water courses using water tank trucks. Water can only be diverted from bodies of water with a declaration of water resources use approved by the environmental agency of the state of Mato Grosso do Sul - IMASUL.

To ensure water availability, the **Surface and Groundwater Qualitative and Quantitative Monitoring Program** is proposed.

E. Solid Waste Collection and Disposal System

The control of solid waste will aim to reduce the risks of contamination of soil and water bodies resulting from improper handling, treatment, and disposal of solid waste generated during the implementation of the work. It will also promote full compliance with the guidelines recommended in Brazil's Solid Waste Policy, established by Law No. 12.305/10. The solid waste generated, whether in the implementation or operation of Project Alpha, will be classified and managed according to CONAMA Resolution No. 307/02 and ABNT's NBR 10.004:2004. Here we highlight the IMA 001 – Waste Disposal Work Instruction, which is already in force.

F. Transport system

In order to minimize impacts generated by transport operations, whether when transporting employees, forest inputs, or timber, the operators of vehicles, trucks, machinery, and equipment should be instructed to avoid peak traffic times. The transport of inputs during alternative business hours should be prioritized to avoid congestion on town roads and highways.

All vehicles, trucks, machinery, and equipment must undergo periodic inspections and adhere to the guidelines outlined in the IMA 001 – Vehicle, Machinery, and Equipment Inspection Work Instruction.

G. Qualification, Hiring, Training and Mobilization of the Workforce

All labor, whether internal or outsourced, must undergo a training process that covers all applicable procedures for the tasks they will perform. The general objective of this program is to inform and raise awareness among workers engaged in work activities about the importance of environmental considerations, guiding them in the consistent implementation of environmentally sound practices.

The IST 004 – Occupational Health and Rural Work Safety Instruction, outlines the necessary safety protocols. The applicable training sessions are detailed in the Training Matrix FG 010.01.

The environmental education program for workers, overseen by the contractors, should include lectures aimed at fostering the development and awareness of employees. These lectures should focus on activities directly related to the job performance, as well as the social and environmental characteristics of the region, and the habits of local communities.

H. Occupational Health and Safety of Workers

Contractors must adhere to the following requirements upon hiring employees:

- Conduct medical examinations as required by law.
- Refer individuals with infectious diseases to the public health system for treatment.
- Provide uniforms and personal protective equipment (PPE) suitable for the position.
- Maintain detailed records of medical assistance and/or emergency medical care, including tracking administered vaccines for worksite employees.

Companies should bear full responsibility for the safety, hygiene, and occupational health of their employees within the workplace, in accordance with Law No. 77/6.514 and Ordinance MT No. 3.214/78. They must also adhere to the responsibilities outlined in these standards and comply with any specific requirements imposed by the company inspections.

The companies will be responsible for ensuring safety during the implementation of their services and for any accidents at work caused by their employees. According to legislation, companies are required to implement the following health and safety programs:

- Environmental Risk Prevention Program (PPRA) in accordance with NR-9
- Work Conditions and Environment in the Construction Industry (PCMAT) - NR-18
- Occupational Health and Medical Monitoring Program (PCMSO), as per NR-7, covering both their personnel and subcontractors. This program should include the name of the Occupational Physician, whether employed by the company or not, who is responsible for the PCMSO.

Based on a risk map, companies must plan the Personal Protective Equipment (PPE) required for each type of service. The supply, monitoring, and mandatory use of PPE must comply with NR-6. Additionally, they must clearly mark areas indicating the obligation and appropriate type of PPE to be worn.

Among the company’s procedures, the following are noteworthy:

- IST 002 – Sector Inspections
- Management Procedure PG 010 – Competence, Training, and Awareness
- IST 004 – Occupational Health and Rural Work Safety Instruction.

12.1.2. Surface and Groundwater Qualitative and Quantitative Monitoring Program

This Environmental Program includes measures that are already covered in all the company's Work Instructions for the Environment, as well as in Work Instructions for Forestry, Machine Operations, and Harvesting, namely:

- IMA 001 – Waste Disposal
- IMA 002 – Leak Control
- IMA 003 – Soil and Water Conservation
- IMA 004 – Natural Ecosystems
- IMA 005 – Environmental Liabilities
- IMA 006 – Use of Water and Electricity
- IMA 007 – Water Resources Monitoring
- IMA 008 – Injured and Deceased Fauna Monitoring
- ISI 001 – Planting and Replanting
- ISI 002 – Soil Preparation
- ISI 003 – Carving and Coppicing
- ISI 004 – Forest Protection
- ISI 005 – Adubation
- ISI 006 – Water Collection
- ISI 007 – Environmental and Social Risk Analysis
- ISI 009 – Ant Control
- ISI 010 – Irrigation
- ISI 011 – Area Cleaning
- ISI 013 – Washing of PPE used in Agrochemicals Application
- ISI 014 – Implementation and Maintenance of Roads and Firebreaks
- ISI 015 – Washing, Disposal, and Return of Agrochemicals Packaging
- ISI 016 – Fuel Storage and Supply
- ISI 017 – Coppicing
- ISI 018 – Storage of Inputs and Agrochemicals
- ISI 019 - Environmental and Social Risk Analysis (ARAS) for Agrochemicals
- ISI 020 – Extraction of Road Maintenance Material
- ISG 001 – Registration and Mapping
- ISG 002 – Purchase of Seedlings
- ISG 003 – Microplanning
- ISG 004 – Property Security

- ISG 005 - Timber Marketing
- IMM 001 - Vehicles, Machinery and Equipment Inspection
- IMM 002 – Machine and Equipment Washing
- ICO 001 – Forest Harvesting
- ICO 002 – Chain of Custody
- ICO 003 – Removal of Exotic Species in Protected Areas
- ICO 004 – Wood Wasp Control and Monitoring
- ICO 005 – Pile Measurement and Wood Shipping
- ICO 006 – Forestry Transport
- ICO 007 – Forestry Loading
- ICO 010 - Wood Chipper and Transport of Wood Chips
- IST 001 – Nutrition
- IST 002 – Sector Inspections
- IST 003 – Water Potability

All the work instructions mentioned above outline control measures and procedures that, if implemented, will help preserve the quality of water resources. These measures **should be regarded as essential components of this Environmental Program**. Additionally, the monitoring measures and proposals outlined in this program must be adhered to.

12.1.2.1. Description

Qualitative and quantitative monitoring of water throughout all stages of project implementation and operation is essential. This monitoring enables managers to make informed decisions and implement corrective measures in case of complications, as well as for simple monitoring and evaluation of the efficiency of drainage systems. Water quality monitoring serves as a fundamental tool in water resources management, and it is crucial to monitor physical, chemical, and bacteriological parameters of water.

Qualitative and quantitative monitoring will include:

- Surface water quality monitoring
- Surface water flow monitoring
- Spring water quality monitoring
- Spring water flow monitoring

It is important to note that water quality and flow rate monitoring are already conducted in Engano Stream. The most recent results of this monitoring were presented in the Environmental Diagnosis. The monitoring points selected for surface water in this program are consistent with those identified in the diagnosis.

12.1.2.2. Objective

The objective of this program is to ensure the maintenance of surface and groundwater quality, with a particular focus on Engano Stream, which is the primary water body traversing Project Alpha. Groundwater quality maintenance will be assessed through monitoring the quality of springs.

The monitoring of surface water and spring flow allows for a better understanding of the impacts of the farm's forest stand management on aquatic ecosystems. This assessment aims to help implement more sustainable agricultural practices to preserve natural resources in the long term.

12.1.2.3. Mitigation, improvement or compensatory measures to be adopted

The implementation of the Surface and Groundwater Qualitative and Quantitative Monitoring Program will serve as a measure to mitigate two environmental impacts identified in the Physical Environment during both the implementation and operational phases of Project Alpha:

- Changes in Water Quality
- Changes in Water Availability

The methodologies outlined for the implementation of the program, including the measures and procedures to be adopted, are described in the following section. Additionally, it is emphasized that the measures and procedures already established by the company’s Work Instructions must be taken into consideration.

12.1.2.4. Methodology

The methodology of this program will be presented in two sub-items, respectively referring to Surface Water Qualitative and Quantitative Monitoring, and Groundwater Qualitative and Quantitative Monitoring.

12.1.2.4.1. Methodology for Surface Water Qualitative and Quantitative Monitoring - Frequency, Parameters, Collections and Sample Network

The methodology of this program stipulates that collections will be conducted **biannually** during the first three years of project operation, with the possibility of revision based on the obtained results. Sampling campaigns will follow the regional seasonal cycle, taking place during periods of rain and drought.

The selected sampling points are the same as those presented in the environmental diagnosis, comprising four points located in Engano Stream, including their entry and exit on the property of Project Alpha. These points already have monitoring results from December 2022, conducted by the company Soluflor.

It should be noted that Soluflor, according to the monitoring report presented, was scheduled to conduct monitoring every six months, as defined by IMASUL, as reported by the company.

During the project's operation, the collection points, sampling frequency, and proposed parameters for qualitative and quantitative water monitoring may be reviewed and modified based on the evolution of water conditions, provided that such changes are technically justified.

The collected water samples will undergo analysis for physical, chemical, and bacteriological parameters. Additionally, water flow rates will be monitored at the same points.

Monitoring must be conducted at the four points identified in the Environmental Diagnosis, as follows and illustrated: These points cover Engano Stream, as previously mentioned, within the interior and boundaries of the DAA (Directly Affected Area) of Project Alpha. The terminology used for the points (ENG – "Engano") follows the same convention used in the work conducted by Soluflor.

Table 12-1- Location of the monitoring points for surface water flow and quality.

POINTS	UTM COORDINATES	
ENG-01	230,814	7,909,106
ENG-02	229,755	7,904,598
ENG-03	227,526	7,901,455
ENG-04	222,380	7,898,749

Four sampling points were distributed sequentially, following the upstream-downstream direction of the watercourse. Each point was selected based on pre-established characteristics representing the landscape and land use, as described below:

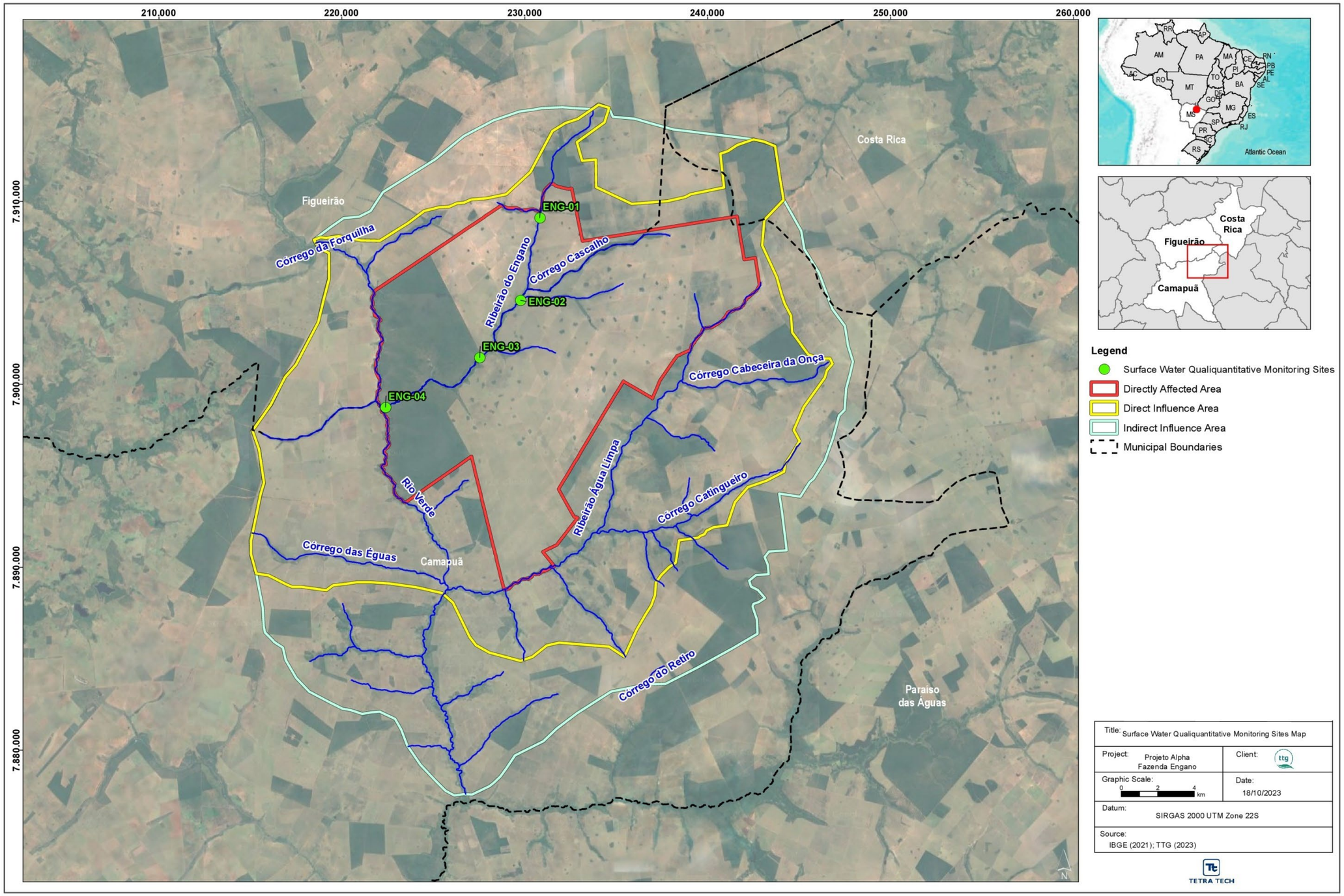
- Point 01, named "ENG01," was located closer to the water's entry point into the rural property, at property's limits.

- Point 02, named "ENG02," was situated within the rural property in an area predominantly characterized by productive activities such as forestry, pasture, or agriculture.

- Point 03, named "ENG03," was positioned within the rural property, surrounded by areas primarily consisting of natural remnants of native vegetation beyond the boundaries of the Permanent Preservation Area (APP).

- Point 04, named "ENG04," was situated where the water exits the rural property, at the property's limits.

Figure 12-1 – Location of the monitoring points for surface water flow and quality.



Source: Tetra Tech (2023).

To evaluate Water Quality, the parameters that must be analyzed are presented in **Table 12-2**, and their results must be compared with freshwater quality standards (CONAMA Resolution No. 357/2005), classified as Class 2.

Table 12-2 – Parameters to be monitored for Surface Water Quality

Surface Water Quality
BLH - In situ Appearance Determination (Liquid Matrix)
BLH - Field Parameter - Dissolved Oxygen in situ
BLH - Field Parameter - pH in situ
BLH - Field Parameter - Turbidity in situ
BLH - Biochemical Oxygen Demand (Liquid Matrix)
BLH - Chlorophyll (Liquid Matrix)
BLH - True Color (Liquid Matrix)
BLH - Total Phenols (Liquid Matrix)
BLH - Indophenol Ammoniacal Nitrogen (Liquid Matrix)
BLH - Total Dissolved Solids, Fixed and Volatile (Liquid Matrix)
BLH - Sulfides (Liquid Matrix)
BLH - Surfactants (Liquid Matrix)
BLH - Anion Scan (Liquid Matrix)
BLH - Cyanobacteria (Liquid Matrix)
BLH - Thermotolerant Coliforms (NMP) (Liquid Matrix)
SPA - Free Cyanide - SKALLAR (Liquid Matrix)
SPA - Total Phosphate and Derivatives (Liquid Matrix)
SPA - Dissolved Metals by ICP MS (Liquid Matrix)
SPA - Metals by ICP MS (Net Matrix)
SPA - Organochlorine Agrochemicals (Liquid Matrix)
SPA - Toxaphene (Liquid Matrix)
SPA - Glyphosate + AMPA (Liquid Matrix)
SPA - Herbicides by HPLC (Liquid Matrix)
SPA SUB - Taste - Qualitative (Analytical Control) (Liquid Matrix)
SPA SUB - Odor - Qualitative (Analytical Control) (Liquid Matrix)
SPA SUB - PCB (Analytical Control) (Net Matrix)
SPA SUB - SVOC (Analytical Control) (Net Matrix)
SPA - VOC (Liquid Matrix)

Source: Parameters provided according to the legal provision: CONAMA Resolution No. 357, of March 17th, 2005.

These parameters were determined to fully comprehend the parameters outlined in the legislation and include fundamental parameters for identifying possible contamination in both the implementation and operational phases of the enterprise. In the future, after evaluation, some parameters may be removed from the monitoring plan.

In order to make the interpretation of water quality data more accessible, the company has chosen to complement the detailed laboratory analyses by adopting the Water Quality Index (IQA) developed by CETESB (Companhia Ambiental do Estado de São Paulo). This choice is based on the IQA's simplicity, data integration and scientific basis, as well as its widespread use in Brazil. In addition, the IQA offers a standardized approach guaranteeing comparability between different sites, identifying seasonal patterns and long-term behavioural trends.

The WQI is calculated by the productory, which weights the water qualities corresponding to the following parameters: sample temperature, pH, dissolved oxygen, biochemical oxygen demand, thermotolerant coliforms (*E. coli*), total nitrogen, total phosphorus, total solids and turbidity. Based on this calculation, the quality of the surface water can be determined, which is indicated by the IQA on a scale of 0 to 100, where higher values indicate better water quality and lower values indicate poorer quality.

It's worth noting for the purposes of this article that assessing water quality using the IQA index has limitations. This index does not analyze important parameters for public water supply, such as toxic substances (e.g., heavy metals, agrochemical constituents, organic compounds, etc.), pathogenic protozoa, and substances that affect the organoleptic properties of water.

The determination of dissolved oxygen, air and water temperature, pH, and electrical conductivity parameters will be performed *in situ* using a digital oximeter (for dissolved oxygen and temperature), a digital thermohygrometer (for air temperature), a pH meter (for pH), and a conductivity meter (for conductivity).

Water samples for the analysis of other physicochemical parameters will be collected directly from the subsurface using polyethylene or glass bottles, either fixed or preserved *in natura*. These samples will then be sent for laboratory analysis between 16 and 48 hours after collection.

As for the bacteriological analysis, water samples will be collected in the subsurface by direct submerging a sterile vial. They will then be immediately packed in Styrofoam boxes with ice, preserved at 4°C. At the end of each collection day, the samples will be sent via air transport to the laboratory.

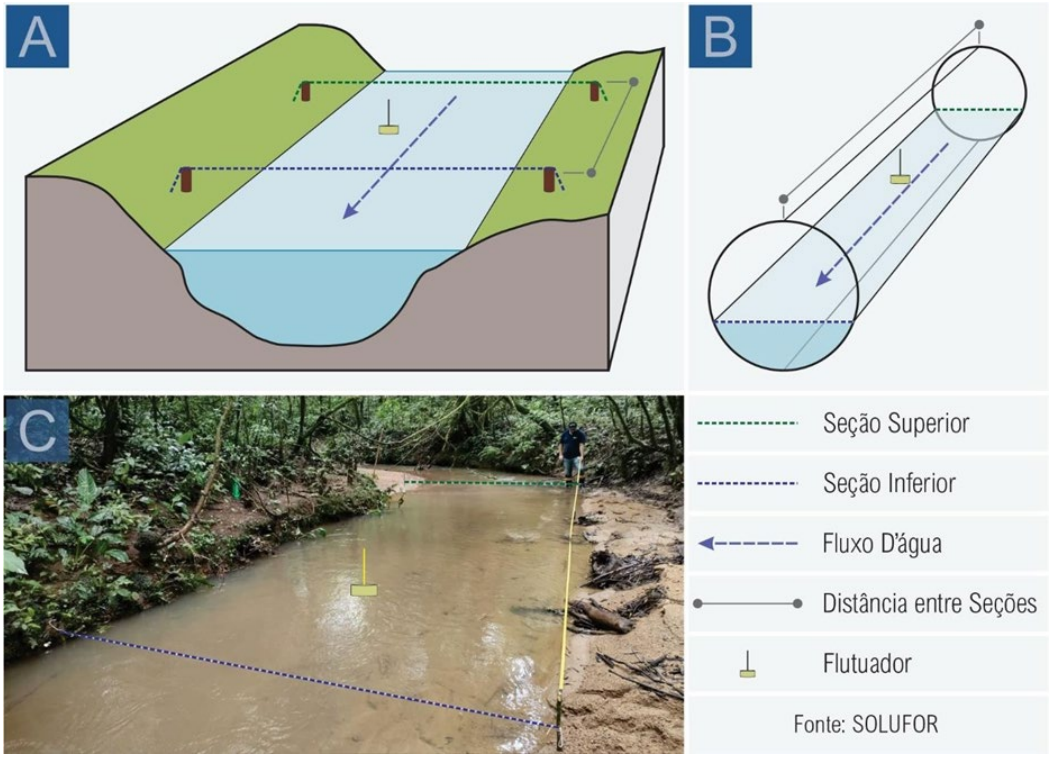
The planning and implementation of water sample collections will adhere to the guidelines outlined in ABNT standards, specifically NBR 9897 – Sampling Planning of Liquid Effluents and Receiving Bodies – Procedure (ABNT, 1987a), and NBR 9898 – Preservation and Sampling Techniques of Liquid Effluents and Receiving Bodies (ABNT, 1987b). Additionally, the guidelines provided in the Standard Methods for the Examination of Water & Wastewater (APHA, 2005) and the Sample Collection and Preservation Guide (CETESB, 1987) must also be followed.

To evaluate the Water Flow Rate, a methodology established in literature, called 'Float Method,' must be employed.

The flow rate represents the volume of water that passes between two points over a period of time. In addition to measuring water availability in the area, its assessment is crucial due to its influence on water quality, the organisms inhabiting it, and their habitats. Naturally, it is affected by climate, increasing during rainy periods and decreasing during dry periods.

Measuring river flow with floats involves determining the displacement speed of a floating object and measuring the time taken for its displacement over a known stretch of river length. **Figure 12.2** illustrates the method to be applied in the field (SANTOS *et al*., 2001).

Figure 12-2– Schematic illustration of the float method



A: Natural watercourse; B: Water flow inside pipes; C Implementation of the float method.
Image source: Soluflor (2022).

The streamflow is expressed by the following equation (PALHARES *et al*., 2007):

$$Q = (A \times L \times C) \div T$$

In which:

Q = Flow rate (m³/s)
A = Average river area (m²)
L = Length of the measurement area (m)
C = Coefficient or correction factor (0.8 for rivers with stony bottom or 0.9 for rivers with muddy bottom). The coefficient allows correction due to the fact that water travels faster at the surface than at the bottom of the river. Multiplying the surface velocity by the correction coefficient gives a more precise measure of the water velocity; an intermediate coefficient of 0.85 can be used if it better fits the watercourse
T = Average time (in seconds) that the float takes to cross length L.

The optimal location for the float method should be determined after an on-site evaluation. The selected section must be free of curves and have a depth of at least 15 centimeters, with flowing water.

12.1.2.4.2. Methodology for Surface Water Qualitative and Quantitative Monitoring - Frequency, Parameters, Collections and Sample Network

The methodological strategy of this Program dictates that collections are conducted quarterly during the first three years of the project's operation, with the possibility of revision based on the obtained results. Sampling campaigns will follow the seasonal cycle.

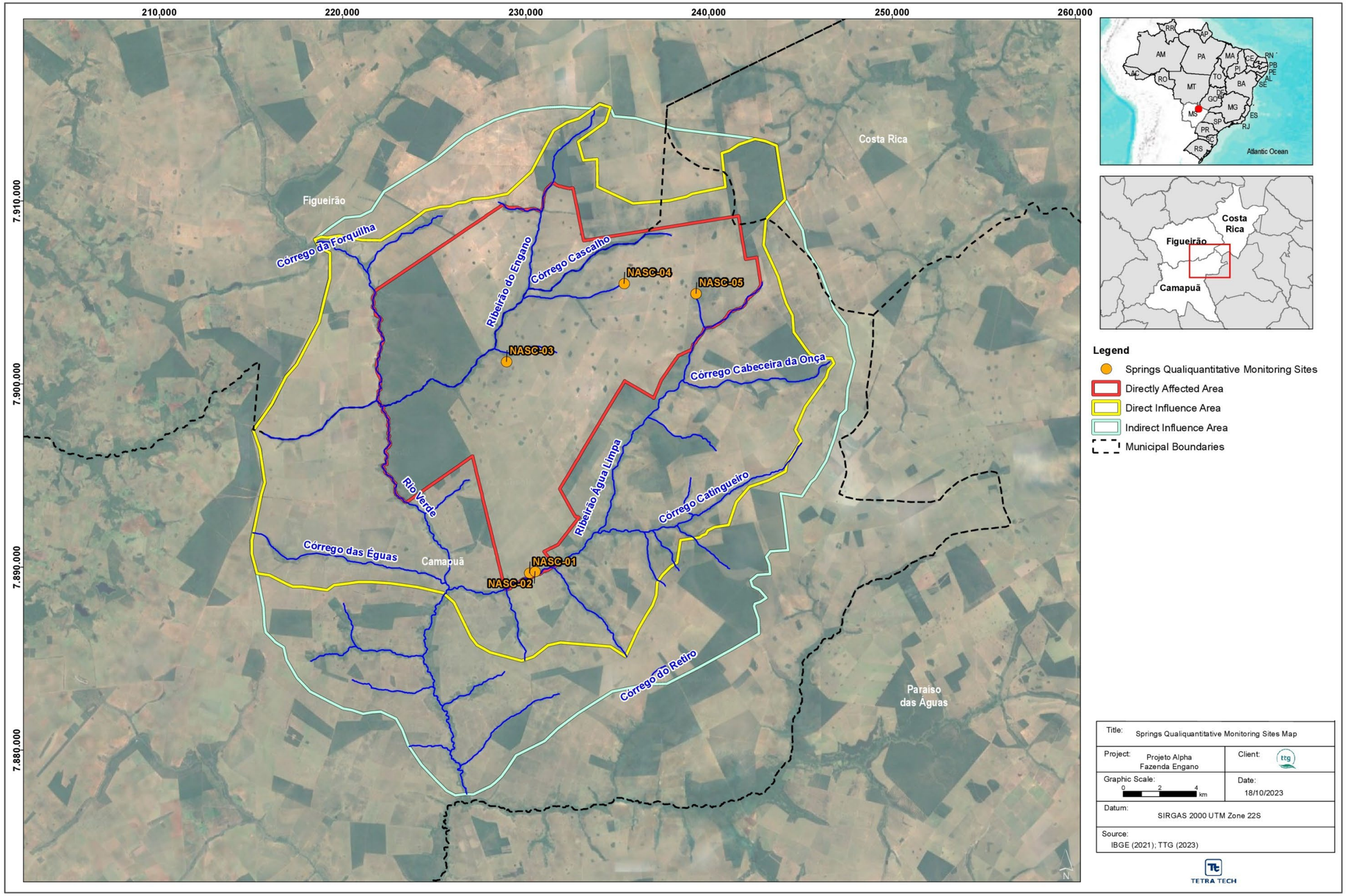
The selected sampling points include the three springs targeted for environmental recovery identified in the PRADA, as referenced in the Diagnosis (see Erosion section), along with additional two points proposed to cover springs located among the planned forest stands, totaling five points. Monitoring the water quality and flow of springs aims to assess groundwater quality and its water availability within the DAA of the project. Throughout the project's operation, based on qualitative and quantitative changes in water parameters, the collection points and proposed parameters may be reviewed and modified, provided that such changes are technically justified.

The groundwater qualitative and quantitative monitoring points are identified below.

Table 12-3– Location of the monitoring points for water quality and flow of springs

POINTS	UTM COORDINATES	
NASC-01	230,191	7,889,679
NASC-02	230,488	7,889,757
NASC-03	228,930	7,901,218
NASC-04	235,351	7,905,490
NASC-05	239,284	7,904,941

Figure 12-3 – Location of the monitoring points for water quality and flow of springs



Source: Tetra Tech (2023).

For the **Water Quality** of the springs, the collection of water samples must follow the same procedures described for surface water collections. It is understood that spring waters may be influenced by the surface environment. However, this program rejects the drilling of monitoring wells for groundwater analysis and instead proposes that the monitoring of parameters for these waters be conducted from the selected springs for flow and quality monitoring.

On the other hand, it should be noted that the water samples from the springs must be evaluated as groundwater samples. Therefore, they will be analyzed according to parameters and reference values recommended by Ordinance GM/MS No. 888, of May 4th, 2021 (potability) and CONAMA Resolution Nº 396/2008 on human consumption, as outlined in **Table 12-4** below. It is important to emphasize that spring water will only be evaluated as groundwater for the sole purpose of comparing parameter results in accordance with the respective legal provisions.

Table 12-4 – Analysis Parameters for Water Quality of Springs and their Reference Values

Parameter	Unit	Portaria GM/MS 888/21	CONAMA 396/08
Conductivity	micro S/cm	-	-
Apparent Color	uH	15	-
Nitrate (as N)	mg/L	10	10
Alkalinity	mg/L	-	-
Bicarbonate	mg/L	-	-
Total Chloride	mg/L	250	250
Calcium	mg/L	-	-
Hardness	mg/L	300	-
Total Iron	mg/L	0.3	0.3
Magnesium	mg/L	-	-
Total Manganese	mg/L	0.1	0.1
Nitrite (as N)	mg/L	1	1
Odor and Taste	Intensity	6	-
Benchtop pH	mg/L	-	-
Potassium	mg/L	-	
Sulfate	mg/L	250	250
Sodium	mg/L	200	200
Total dissolved solids	mg/L	500	1000
Temperature - Customer Measurement	ºC	-	-
Total coliforms	MPN/100 mL	absence	absence
Escherichia coli	MPN/100 mL	absence	absence

Some parameters should be measured directly at the collection site, including water temperature, depth, transparency, pH, turbidity, electrical conductivity, and dissolved oxygen in the water column.

The collections and physical-chemical and biological analyses will be conducted by a laboratory certified and accredited by Brazil's National Institute of Metrology, Standardization, and Industrial Quality (INMETRO), or by an agency that maintains mutual recognition with it, or by a laboratory approved by a metrological network that has a system for recognizing competence based on the requirements of NBR ISO/IEC 17.025/2005 and ISO 5667-11/2009 (Water Quality Sampling – Part 1: Guidance on Groundwater Sampling).

The analyses will be conducted according to the standardized methods outlined in the Standard Methods for the Examination of Water and Wastewater (APHA, AWWA, WEF, 1998), with maximum permitted values aligned with those adopted in CONAMA Resolution No. 396/2008 on groundwater.

To evaluate the Water Flow of the springs**,** the same methodology described for surface water flow in the previous section, referred to as 'Float Method', must be employed. In addition, monitoring of the selected springs will follow the same simplified and effective approach used to assess surface water quality, using the Water Quality Index (IQA). This methodology will be applied to ensure standardization and comparability between the different sites, contributing to consistent management of the quality of the project's water resources.

It is important to note that the exact point where the watercourse originates may present physiographic challenges for the application of flow measurement with floats. Therefore, efforts should be made to select a stretch as close as possible to the source to ensure accurate flow measurement.

12.1.2.5. Material and human resources

The following resources will be required for the implementation of the Program:

- **Material Resources**

Equipment (pH meter, conductivity meter, oximeter, and thermometer) will be required for collection, as well as consumables. Vehicles will be needed for the team's transportation.

Multiparameter instruments for in-situ analysis of water quality parameters, glass and polyethylene bottles for water sample collection, thermal boxes for sample storage, and supporting materials such as gloves, field forms, etc., are also necessary. Personal protective equipment (PPE), GPS devices, and cameras need to be provided as well.

- **Human Resources**

The entrepreneur must employ analysts capable of collecting and analyzing samples of the physical, chemical, and biological parameters of the water. Alternatively, they can hire a licensed environmental analysis laboratory for this activity.

12.1.2.6. Environmental indicators

For the evaluation of this Program, the maintenance level of the physical-chemical and biological conditions of the inventoried water resources will serve as an indicator, considering the normal patterns of seasonal variation and the relationship of enterprise activities and operations with the environment.

Following this evaluation, proposals for modifications may be suggested to address any identified failures or to better reflect the data according to local realities and needs. These proposals will be submitted to environmental agencies for review, approval, and oversight.

The documents must be based on technical reports of physical, chemical and bacteriological analyses of water quality, compared with the quality standards for surface and groundwater established in environmental legislation – CONAMA Resolution Nº 357/2005 and CONAMA Resolution Nº 396/2008, respectively.

12.1.2.7. Stages of the enterprise

This Program will be implemented both in the implementation and operational phases of Project Alpha. It will primarily focus on the operational phase, enabling us to assess potential impacts on water quality and availability in the region.

12.1.2.8. Implementation timeline

The schedule for the Surface and Groundwater Qualitative and Quantitative Monitoring is presented below.

Table 12-5 - Schedule for the Surface and Groundwater Qualitative and Quantitative Monitoring

Activities	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Surface and Groundwater collection and flow measurement campaigns												
Material and laboratory analysis												
Issuance of report												

12.1.2.9. Recording and tracking systems

From the results of the monitoring of water quality and flows, monitoring reports will be prepared for each campaign, along with an annual report containing compiled results from the campaigns conducted during the period. This report will also include a reassessment regarding the consistency of the Program, parameters, and methodology.

The documents must be based on technical reports of physical, chemical and bacteriological analysis of water quality, compared with the quality standards for surface and groundwater established in environmental legislation – CONAMA Resolution Nº 357/2005 and CONAMA Resolution Nº 396/2008, respectively.

Currently, the company produces a consolidated report through the company's ESG results report, incorporating results from surface water quality and flow monitoring, with follow-up reports after each campaign, as well as a comprehensive annual report. This annual report not only compiles the results of all the campaigns conducted during the period, but also includes a reassessment of the consistency of the Program, parameters, and methodology used. The preparation of these reports should be continuous, this time including the results of monitoring the springs.

12.1.2.10. Responsibility for the implementation

The implementation of the Surface and Groundwater Qualitative and Quantitative Monitoring Program will be the responsibility of the entrepreneur in an integrated manner. The company is responsible for implementing this Program and may hire an outsourced team for its feasibility.

12.1.3. Erosion Control and Monitoring Program

This Environmental Program includes some measures that are already covered by the company's Environmental Work Instructions, Forestry Work Instructions, as well as Machinery Work Instructions and Harvesting Work Instructions, namely:

- IMA 003 – Soil and Water Conservation
- IMA 004 – Natural Ecosystems
- IMA 005 – Environmental Liabilities
- IMA 007 – Water Resources Monitoring
- ISI 002 – Soil Preparation
- ISI 003 – Forest Stand Delineation, Thinning and Coppicing
- ISI 006 – Water Abstraction
- ISI 007 – Environmental and Social Risk Analysis
- ISI 011 – Area Cleaning
- ISI 014 – Implementation and Maintenance of Roads and Firebreaks
- ICO 001 – Forest Harvesting
- ICO 006 – Forestry Transport

All the aforementioned work instructions include control measures and procedures. If executed properly, these measures will help preserve soils and land, significantly contributing to the prevention and mitigation of erosion. They **must be considered an essential part of this Environmental Program.**

Furthermore, the measures and proposals for monitoring/surveys presented in this work should be emphasized and reinforced.

12.1.3.1. Description

The implementation and operation of Project Alpha will require topographic regularization of the land and compaction, potentially altering the flow of surface water runoff, particularly concerning the watercourses in the surroundings. Moreover, existing erosional and siltation environmental liabilities in the area are attributed to the inherently sandy and erosion prone soil, associated with the anthropic activities on the farm.

Thus, it is essential to monitor the development of surface dynamics processes (erosion and sediment entrainment) during the implementation phase and the entire operational phase of the project.

12.1.3.2. Objective

The primary objective of this program is to monitor the implementation and operation of forest stands and adjacent areas planned for the project, while focusing on actions aimed at minimizing impacts associated with the initiation of erosional processes and sediment transport. Monitoring and mitigating sediment transport help prevent materials from being carried into adjacent watercourses and springs, thereby contributing to the preservation of water body quality and availability.

12.1.3.3. Mitigation, improvement or compensatory measures to be adopted

The implementation of the Erosion Control and Monitoring Program will serve as a mitigation measure for two environmental impacts identified in both the implementation and operational phases of Project Alpha regarding the Physical Environment:

- Changes in Surface Dynamics
- Changes in Water Quality

The methodology outlined for the implementation of this program, including the measures and procedures to be adopted, is described in the following section. In addition, it is reiterated that the measures and procedures already established by the the company's Work Instructions must be considered.

12.1.3.4. Methodology

Measures to control and monitor surface dynamics are listed below:

- **Control**
  - ✓ Reduce the exposure time of unprotected soil surfaces as much as possible.
  - ✓ Protect soil surfaces exposed to erosion.
  - ✓ Install an adequate drainage system in all project sectors to prevent damming, runoff, and concentrated release of rainwater into the natural terrain. This also prevents surface girding caused by concentrated surface runoff.

- ✓ Periodically check the conformity of the soil surface in administrative areas, roads, access routes, and firebreaks, ensuring the correct direction of surface flows.
- ✓ Periodically inspect for sediment entrainment during precipitation periods by identifying traces that indicate the flow of materials.
- ✓ Conduct periodic maintenance of drainage systems, removing any materials that may cause obstruction (such as sediments, leaves, branches, etc.), and dispose of them properly.
- ✓ Periodically assess the performance of drainage systems and make corrections when necessary.

➢ **Monitoring**

- ✓ Conduct **monthly** surveys along the DAA (Directly Affected Area), focusing on the following:
  - o Mapping and identification of exposed areas, rainwater drainage runoff, drainage channels, erosion prone areas, and sediment entrainment.
  - o Inspection of the banks of Engano Stream and of all watercourses permeating the DAA, as well as the headwaters of the watercourses in the area to identify any sediment transport to the water bodies during the implementation or operation of the project.

These measures should be implemented by professionals trained to identify evidence of erosion or sediment flows, as well as to assess the compliance of drainage system implementation. They should also identify surface areas experiencing irregular conditions regarding the potential for erosion to develop.

It is important to note that, in addition to the procedures and measures outlined in the company's Work Instructions, there is a Degraded Area Recovery Plan (PRADA), designated for previously identified points along the banks of watercourses and headwaters of springs. All measures and procedures suggested by the PRADA should also be considered as part of this Environmental Program.

In summary, the monitoring activities to be conducted must be developed as follows:

➢ **Erosion**

It will be carried out through visual inspection on a monthly basis, including photographic documentation, geographical coordinates, identification of the occurrence (adding the number of each); characterization of the occurrence, proposing remediation measures, and recording in an environmental inspection spreadsheet (for the occurrence and for the technical proposal crafted by the team working in the field). This spreadsheet will be sent monthly to the responsible parties of the enterprise for awareness and action, whenever necessary.

➢ **Siltation**

Monthly visual inspections of water bodies located at points bordering and within the DAA will be conducted, accompanied by photographic documentation and monitoring of any siltation progression. Additionally, it is crucial to evaluate the rainwater drainage system, identifying any obstructions or siltation of drainage devices that could compromise its functionality.

12.1.3.5. Material and human resources

➢ **Material Resources**

- Office supplies
- Field equipment (computer, GPS, camera, etc.)
- Personal protective equipment

➢ **Human Resources**

- Internal or outsourced team trained and responsible for monitoring erosion and for implementing/maintaining control measures.

12.1.3.6. Environmental indicators

The following indicators will be used to evaluate the Erosion Control and Monitoring Program:

- Successful implementation of prevention, correction, and/or mitigation measures in areas with identified non-conformities.
- Efficient operation of drainage systems.
- Measures to prevent and/or mitigate siltation of any water body.

It is proposed that inspections be conducted monthly, with the generation of monthly reports and an annual compilation of the Environmental Program to be submitted to those responsible for the the company project at Project Alpha.

12.1.3.7. Stages of the enterprise

This Program will be implemented in the implementation and operational phases of Project Alpha.

12.1.3.8. Implementation timeline

Table 12-6 - Schedule for the Erosion Control and Monitoring Program

Activities	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Inspection - Erosion												
Inspection - Siltation												
Issuance of Monthly Report												
Issuance of Consolidated Annual Report												

12.1.3.9. Recording and tracking systems

Following the results of the erosion monitoring, follow-up reports will be issued for each campaign. These reports will contain spreadsheets, photographic documentation, and notes observed regarding each identified point of non-compliance. Additionally, monthly reports will be issued to describe the activities of the period. An annual report will also be compiled, containing the results of the campaigns executed in the 12-month period, along with a reassessment of the consistency and operability of the Program and its methodology.

12.1.3.10. Responsibility for the implementation

The implementation of the Erosion Control and Monitoring Program will be the responsibility of the entrepreneur in an integrated manner. The company is responsible for implementing this Program and may hire an outsourced team for its feasibility.

12.1.4. Solid Waste and Chemicals Management Program

This Environmental Program incorporates measures already outlined in the company's Work Instructions, with particular emphasis on:

- IMA 001 – Waste Disposal
- IMA 002 – Leak Control
- IMA 003 – Soil and Water Conservation
- IMA 004 – Natural Ecosystems
- IMA 005 – Environmental Liabilities
- IMA 006 – Use of Water and Electricity
- ISI 007 – Environmental and Social Risk Analysis

- ISI 009 – Ant Control
- ISI 010 – Irrigation
- ISI 011 – Area Cleaning
- ISI 013 – Washing of PPE used in Agrochemicals Application
- ISI 015 – Washing, Disposal and Return of Agrochemical Packaging
- ISI 016 – Fuel Storage and Supply
- ISI 017 – Coppicing
- ISI 018 – Storage of Inputs and Agrochemicals
- ISI 019 – Environmental and Social Risk Analysis (ARAS) for Agrochemicals
- IMM 001 – VME Inspection (Vehicles, Machinery and Equipment)
- IMM 002 – Machine and Equipment Washing
- ICO 006 – Forestry Transport
- ICO 010 – Wood Chipper and Transport of Wood Chips

All the work instructions mentioned above outline control measures and procedures that, if implemented, will help preserve the quality of water resources. These measures **should be regarded as essential components of this Environmental Program**.

Among the aforementioned instructions, ISI 019 – Environmental and Social Risk Analysis (ARAS) for Agrochemicals stands out, with its content reproduced in this document. Additionally, there is a Solid Waste Management Program (PGRS) prepared by the company with a focus on Project Alpha and issued in May 2023. The content of this document is also incorporated into the present document.

12.1.4.1. Description

In the tasks carried out during the implementation and operational stages of the project, solid waste is generated. This waste is classified according to ABNT's NBR 410.004/2004 standard as Class I (Hazardous), Class IIA (Non-inert) and Class IIB (Inert). Any failures in handling, storage, transport, or disposal of such waste may result in environmental impacts.

The implementation of this program aims to ensure that the waste generated during the implementation and operational phases of the project is managed through operational procedures enabling actions related to waste management. These procedures include aspects related to waste minimization, segregation, identification, collection, internal transport, temporary storage, external transport, and final disposal, all in accordance with technical and environmental criteria and current legislation. Additionally, this program lists actions aimed at the management of chemicals, involving aspects such as storage, identification, use, transportation, and response to leaks[13].

12.1.4.2. Objective

The objective of this program is to establish and implement appropriate procedures for the management of solid waste generated during the implementation and operation of the project.

The program aims to minimize waste generation, segregate it according to its class, control and reduce environmental risks, ensure correct handling, and ensure proper final disposal in accordance with current legislation. It also aims to raise employee awareness regarding the importance of proper waste disposal. Additionally, this program addresses the proper packaging, identification, and use of chemicals to prevent environmental pollution.

12.1.4.3. Mitigation, improvement or compensatory measures to be adopted

The implementation of the Solid Waste and Chemicals Management Program will serve as a measure to mitigate the following environmental impact identified for the Physical Environment during the implementation and operational phases of Project Alpha:

- Changes in Water Quality

The methodologies established for the implementation of the program, which contain the measures and procedures to be adopted, are described in the following section.

12.1.4.4. Methodology

The methodology for this program will be presented in two sub-items, referring respectively to Solid Waste Management and Chemicals Management.

[13]NOTE: Although accidents/incidents are not conceptually treated in Brazil as environmental impacts (but as environmental risks), this program lists leakage response measures as an integral part of chemical management.

12.1.4.4.1. Methodology for Solid Waste Management

Solid waste management encompasses a set of procedures and recommendations aimed at reducing waste generation from project operations and ensuring their proper management.

These procedures should be integrated into the daily activities of the employees involved in the implementation and operation of Project Alpha.

The guidelines outlined in this program are aligned with Brazil's National Solid Waste Policy (PNRS) and include the steps detailed below, which will be elaborated upon in the following section.

- **Individual actions**:
  - Identification and classification of waste generated in the enterprise, in accordance with current standards.
  - Segregation and packaging of waste.
  - Training and awareness of workers.

- **Actions to be performed collectively:**
  - Collection, transportation and sorting.
  - Transport and final disposal.
  - Monitoring and control.

12.1.4.4.1.1. Description of steps and activities for Solid Waste Management

The Solid Waste Management Program shall be executed in accordance with the topics of this section, which comply with applicable legal requirements and standards, namely:

- Law No. 12.305/2010: National Solid Waste Policy.
- Law No. 6.938/1981: National Environmental Policy.
- NBR 10.004/2004: Solid Waste – Classification.
- NBR 11.174/1990: Storage of Non-inert and Inert Waste.
- NBR 12.235/1992: Storage of Hazardous Waste.
- CONAMA 275/2001: Establishes color coding for selective waste collection.
- CONAMA 313/2012: National Solid Waste Inventory.
- Law No. 2.080/2000: Generation, packaging, storage, collection, transportation, treatment, and final disposal in the State of Mato Grosso do Sul.
- Ordinance No. 280/2020 of Brazil's Ministry of the Environment (MMA).

➢ **Waste Origin and Classification**

Waste generated at Project Alpha must be segregated where it is generated and stored in containers identified according to their classification (CONAMA Resolution Nº 275/2001). **Table 12-7** lists the waste generated by sector and their respective classifications.

Table 12-7 - Waste generated by sector and their respective classifications

Waste	Class	Silviculture	Harvesting	Administrative
Agrochemicals packaging	Class I	X		
PPE contaminated with agrochemicals	Class I	X		
Waste material from agrochemicals application equipment (knapsack sprayer)	Class I	X		
Expired Products	Class I	X		
Soil, hose filters and parts contaminated with oil and grease	Class I	X	X	
Paper, cardboard, plastic, and metal contaminated with oil and grease	Class I	X	X	
PPE contaminated with oil and grease	Class I	X	X	
Burnt oil	Class I	X	X	
Telephone and radio batteries	Class I	X	X	X
Non-alkaline batteries	Class I	X	X	X
Printer cartridge	Class I			X
Fluorescent lamps	Class I			X
Plastic, paper, metal	Class IIa	X	X	X
Paper bags (substrate, cement, etc.)	Class IIa			X
Fertilizer bags	Class IIa	X		
Styrofoam	Class IIa			X
Lunch box (metal)	Class IIa	X	X	X
Dirty plastic, paper, metal	Class IIa	X	X	X
Leftover food generated in the field	Class IIa	X	X	
Leftover food generated in the cafeterias	Class IIa			X
Cooking oil	Class IIa			X
Grease from cafeteria kitchen hoods	Class IIa			X
Oil-contaminated water	Class I	X	X	
Tires	Class IIa	X	X	X
Used and damaged PPE	Class IIa	X	X	X
Waste from containment basins	Class IIb			X

Waste	Class	Silviculture	Harvesting	Administrative
Waste from sweeping and cleaning	Class IIb			X
Debris (civil construction)	Class IIb			X
Waste bags and big bags	Class IIb	X		

Source: PGRS (2023).

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➢ **Waste Reduction Program**

The company, through training provided to customers and service providers, provides guidance on the reduction and reuse of recyclable waste. Environmental education programs emphasize the priority of waste prevention, reduction, reuse, recycling, treatment, and environmentally appropriate final disposal.

➢ **Segregation**

Segregation is the sorting and separation of waste, identifying it at the time of its generation, seeking proper storage methods, and ensuring environmentally appropriate final disposal.

The purpose of waste segregation is to prevent the mixing of incompatible waste, thereby enabling reuse, recycling, and safe handling.

A. Waste Identification

The identification of waste aims to ensure correct segregation at generation sites and must be present on packaging, containers, storage sites, and internal and external waste collection vehicles.

Symbols based on ABNT's NBR 7.500 to 7.504 and CONAMA Resolution No. 175/2001 are used in order to provide guidance on the risk of exposure.

B. Solid Waste Handling and Disposal

Waste handling must comply with technical criteria aimed at minimizing risks to worker health and environmental quality. The final disposal of waste must be conducted in accordance with its characteristics and classification, and may involve recycling or disposal in landfills or industrial landfills.

C. Waste Classification

It involves the classification of waste according to ABNT's NBR 10.004, subjecting the waste to solubility and leaching tests, as per NBRs 10.006 and 10.005 respectively. This step aims to classify, quantify, and provide guidance for the correct identification and segregation of waste where it was generated. According to NBR 10.004 'Solid waste – Classification,' of the Brazilian Association of Technical Standards (ABNT), the types of waste are divided as follows.

Table 12-8 - Classification of waste according to NBR 10.004

Classification	Type	Features
Class I	Hazardous	Dangerous waste due to its flammability, corrosivity, reactivity, toxicity, and pathogenicity.
Class IIa	Non-inert	Waste that is not hazardous or inert, and may have properties such as combustibility, biodegradability, or water solubility.
Class IIb	Inert	Waste that, when subjected to tests and solubilization (NBR 10.007), does not have any of its constituents solubilized in concentrations higher than the standards of water potability.

According to the standard, waste must be directed to the Final Disposal System. Class I waste should be disposed of in an industrial or incinerated solid waste landfill. Class II "a" or "b" waste, however, should be destined for reuse, recycling, treatment, landfills, or alternative disposals.

D. Selective Waste Collection

The differentiated collection of waste at the generating sources, aiming to forward them for treatment, reuse, recycling, and other disposals, must comply with the guidelines of Selective Waste Collection.

➢ **Temporary Storage**

This refers to the temporary waste storage area, which must comply with the following safety and environmental protection measures, according to NBR 11.174/89 (for Class IIa and IIb waste) and NBR 12.235/87 (for Class I waste):

- **Class I Waste**
  - Waterproofed floor
  - Covering and ventilation
  - Rainwater drainage

- Drainage of percolating liquids and accidental spills
- Containment basin
- Isolation and signaling

- **Class II Waste**
  - Containers and barrels must be labeled and in good condition

➢ **Waste Transportation**

- **Class I**
  - Transport must comply with road transport regulations for products.
  - The driver must be accredited and have adequate training. They must carry on an envelope containing an emergency form with instructions for accidents, fires, ingestion, and inhalation, as well as a contact telephone number.
  - The truck must be a tanker trailer truck, a truck with trailer cover, or a box truck. The truck must also contain an emergency kit.

- **Class II**
  - To carry out the transport of class II waste, the vehicle must comply with the provisions of the specific legislation.

➢ **Collection and Storage**

It involves transferring the packaged waste from the generation site to temporary storage. All employees are responsible for segregating and storing the waste at the generation site. Each sector is responsible for separating and transporting its waste to the bays where it is stored. Once a sufficient quantity is accumulated to fill a load, it is sent for treatment by an accredited company.

In the event of container rupture, liquid leaks, waste spillage, or other unwanted situations, employees are trained to respond in order to mitigate any environmental damage (the company's Emergency Response Plan). The company develops training, awareness, and competence programs for the teams involved.

Table 12-9- Waste Storage

Waste Description	Storage
Agrochemicals and expired products packaging	Packages of agrochemicals and expired products are stored in agrochemicals warehouses according to the technical specifications of the ABNT standards.
Waste contaminated with oil and grease	Waste contaminated with oil and grease is packed in drums or buckets and stored in designated areas for storing contaminated waste temporarily. These areas are covered, impermeable, and identified.
Contaminated and/or used oil	They are packaged in temporarily identified packaging until final disposal. In the bay, it is stored in a container with a containment basin according to the ABNT standard.
Sanitary wastewater	The sanitary wastewater is destined for septic tanks or Sewage Treatment Plants.
Organic waste	Organic waste (leftover food) is buried through a pipe to prevent access by wild animals.
Plastic, glass, paper, metal	The waste is stored in containers that identify the material to be disposed of, complying with the international color code for each type of waste. The waste generated in the selective collection is properly stored in waste bays.
Ordinary waste (general non-recyclable or mixed, not separable, waste)	

➢ **Selective Waste Collection Program**

All waste generated during the activities must be separated and disposed of in the proper containers. These containers are identified by symbols and colors corresponding to the waste type. If color-coded containers are not available, the container should be identified and the environmental sector should be informed for proper disposal.

Table 12-10 - Color patterns for waste segregation and identification.

Color	Waste
Blue	Paper
Red	Plastic
Green	Glass
Yellow	Metal
Black	Wood
Orange	Hazardous waste
White	Hospital and health care service waste
Brown	Organic waste
Grey	Non-recyclable or non-separable waste (non-hazardous)

➢ **Final Disposal**

According to the Solid Waste Management Program (PGRS), the company manages waste according to technical criteria and operational procedures aimed at minimizing the risk to public health and to the environment.

The treatment encompasses the set of units, processes, and procedures that guarantee the proper handling, packaging, and final disposal of the waste generated in the company's area. The final disposal of waste is carried out according to the characteristics and classification and may be subject to treatment (recycling, decontamination, incorporation, reprocessing) or disposal in landfills and co-processing facilities. Disposal certificates are filed within the company's Waste Management System. The final disposal of waste must be monitored using the appropriate legal devices such as the Waste Transportation Manifest (MTR) and the Final Disposal Certificate (CDF).

Table12-11- Waste Disposal

Waste	Disposal
Agrochemicals and expired products packaging	Agrochemicals packagings are sent to collection stations or to incineration facilities. PPE used for agrochemical application is washed by specialized and licensed companies.
Waste contaminated with oil and grease	Waste contaminated with oil and grease is sent for co-processing or incineration facilities. 200-liter oil or grease drums are reused for packaging waste contaminated with oil and grease.
Contaminated and / or used oil	All materials are destined for reprocessing by an authorized and licensed company according to resolution No. 20 of June 18th, 2009 of Brazil's National Agency of Petroleum, Natural Gas and Biofuel (ANP).
Plastic, paper, glass, metal	Recyclable waste can be reused when possible or sent for recycling through sale or donation.
Ordinary waste (general waste not recyclable or mixed, not separable)	Ordinary waste is destined for landfills or duly licensed co-processing facilities, whether municipal or private. Organic waste is buried outside Legal Reserves and Permanent Preservation Areas.

➢ **Waste generation**

The generation, quantification, and disposal of waste are controlled with form FMA 001.02 – Waste Disposal Control. At the time of collection, the Waste Transport Manifests (MTRs) are generated by the transport company. After the waste is disposed of, certificates of final disposal are issued.

The disposal documents and the spreadsheets containing the quantification and qualifications of the waste are stored and periodically checked using the company's internal server.

12.1.4.4.2. Methodologies for Chemicals Management

The focus on Chemicals Management is justified due to the presence and use of chemicals for pest and ant control, including agrochemicals employed in forestry. Additionally, other frequently used products in any enterprise are fuels and lubricants utilized in machinery and equipment.

This section draws from the IFC documents, specifically:

(i) *Environmental, Health, and Safety (EHS) Guidelines: General EHS Guidelines, IFC – International Finance Corporation, World Bank Group, 2007*
(ii) *Environmental, Health, and Safety Guidelines: Forest Harvesting Operations, IFC – International Finance Corporation, World Bank Group, 2007*

Likewise, the content of ISI 018 – Work Instruction for Forestry – Storage of Inputs and Agrochemicals, by the company, was used.

- **General guidelines for the use of fuel and lubricants**

Forestry operations and the construction of roads and access roads involve the use of machinery, vehicles, and related fuels, as well as lubricants and other materials that can cause negative impacts if accidentally[14] spilled. To mitigate this possibility, equipment should not be washed near streams or in areas lacking paving and containment basins to prevent the entry of hazardous materials into the environment. The same precautions should be taken for oil/hydraulic fluids.

Used fuel and lubricant must be handled properly by trained professionals and stored in areas with paving, covering, and containment basins.

- **Use of Agrochemicals**

Agrochemicals can be employed to prevent wood perforation by pests and/or to prevent damage caused by ants and other insects on stored wood. The use of agrochemicals can be justified in forestry, provided that they are applied locally and adhere to the practices outlined in the relevant document.

[14]NOTE: Although accidents/incidents are not conceptually treated in Brazil as environmental impacts (but as environmental risks), this program lists measures to prevent leaks as an integral part of chemical management.

The following measures should be considered when designing and implementing a pest control strategy, giving preference to alternative pest management practices, with the use of synthetic agrochemicals as the last resort.

➢ **Alternatives to the Application of Synthetic Agrochemicals**

Where possible, the following alternatives to convencional agrochemicals should be considered:

- Training in pest and weed identification, field identification, and search.
- Employing mechanical control (pruning/cutting) of weeds and/or thermal weed control.
- Protecting pest predators by providing habitats such as shrubs for nesting sites and other natural vegetation that may harbor pest predators.
- Supporting and using beneficial organisms, such as birds, mites, and microbial agents, to perform pest control.
- Using mechanical controls such as traps and barriers to kill, relocate, or repel pests.

➢ **Application of Agrochemicals**

In the need to apply agrochemicals, the following measures must be observed:

- Undergo training for agrochemical application with applicable certifications or equivalent training.
- Follow the instructions provided by the manufacturer. The label provides information on the recommended dosage and safe use of agrochemicals.
- Apply agrochemicals based on criteria such as field observation (direct pest observation), weather data, treatment time and dosage, and keep a agrochemicals logbook to record such information.
- Avoid the use of agrochemicals that fall under the World Health Organization's Classes 1 and 1B.
- Avoid the use of agrochemicals listed in Annexes A and B to the Stockholm Convention[15].
- Use only agrochemicals manufactured under license, and registered and approved by the competent authority.
- Follow the Food and Agriculture Organization's International Code of Conduct on the Distribution and Use of Pesticides.
- Use technologies designed to reduce spills or unintentional runoff.
- Maintain and calibrate pesticide application equipment.
- **NEVER** use agrochemicals on Permanent Preservation Areas of streams or springs.

[15]The Stockholm Convention or Stockholm Convention on Persistent Organic Pollutants is an international treaty signed in 2001 in Stockholm, Sweden, and was sponsored by the United Nations Environment Programme.

12.1.4.4.2.1. Handling, Storage and Use of Agrochemicals

To prevent, reduce, or control potential contamination from accidental spills during transfer, mixing, and/or storage, agrochemicals must be stored and handled in accordance with the following practices:

- Store the agrochemicals in their original packaging, in a dedicated, dry, cool, frost-free, and well-ventilated place that can be locked and properly identified with signs, with limited access to authorized personnel.
- The mixing and transfer of agrochemicals must be carried out by trained personnel in ventilated and well-lit areas, using containers designed and dedicated for this purpose.
- Contaminated containers should be handled as hazardous waste and treated accordingly.
- Buy and store only the necessary agrochemicals, always using the products that have been in stock the longest.
- Collect rinsing water from equipment cleaning for reuse (for example, for the dilution of agrochemicals in the concentrations used for application).
- Ensure that protective clothing worn during application is sanitized in an environmentally responsible manner.
- Never store agrochemicals near Permanent Preservation Areas of rivers or springs.
- Keep records of the use and effectiveness of agrochemicals.

For this section, particularly, content refers to ISI – 018 – Storage of Inputs and Agrochemicals, by the company, as follows:

➢ **Normative References**

- **<u>Brazilian Standards:</u>**
  - NBR 9843 of July 2013 – Agrochemicals and Related products - Storage, Handling, and Management in Storerooms, Warehouses, and Laboratories
  - NBR 12.235 of April 1992 – Storage of Hazardous Solid Waste
  - NBR 11.174 of 1990 – Storage of Waste Class IIA - Non-inert and Class IIB – Inert

- **<u>Procedures and Programs:</u>**
  - Rural Work Risk Management Program (PGRTR)
  - Occupational Health and Medical Monitoring Program (PCMSO)
  - Material Safety Data Sheet (MSDS)
  - Emergency Sheets for Transport (FE)
  - IMA 001 – Waste Disposal

- IMA 002 – Leak Control
- IST 002 – Sector Inspections
- PG 006 – Emergency Preparedness and Response
- FST 002.02 - Sector Inspection Report for the Storage of Inputs
- MSI 003 – Standardization for Fertilizer Stacking
- ISI 019 – Environmental and Social Risk Analysis (ARAS) for Agrochemicals
- FSG 004.08 – Material Handling Control Sheet

➢ **Technical Characteristics of Inputs and Agrochemicals Warehouses:**

- Agrochemicals should be stored safely, regardless of their quantity.
- Warehouses must be located in an area free from flooding and should be separated from water sources and other buildings by a minimum distance of 30 meters (NR 31).
- Warehouses must be isolated from places where products that pose a risk of explosion and fire are stored.
- Warehouses must be far from springs, complying with municipal regulations established by the public authorities. For example: dams, rivers, streams, lakes, etc.
- Warehouses must ensure adequate access for the rescue service and the fire department in case of fire, besides of the main entrance.
- In the construction of the building, it should preferably be exclusive for the storage of agrochemicals. If not possible, at least create physical separation (wall) between the area for agrochemicals storage and the area intended for other inputs, such as fertilizers, inoculants, implements, and others. The area must be isolated by a wall and have an independent exit. Access should be restricted and the door must remain locked.
- Warehouses must be made from non-combustible material, preferably masonry, with good ventilation and natural lighting, preventing access by animals and unauthorized people.
- The roof should be in good condition, free from infiltration, resistant, and without leaks to keep the storeroom dry. The roof structure must be adequately sized to withstand the rain loads to which it will be subjected to.
- Offices, bathrooms, kitchen, cafeteria, and changing rooms with showers and lockers for operators must be built outside the warehouse or isolated from it.
- Electrical installations must be in good condition to avoid short circuits and fires, and must undergo periodic inspections.
- The floor must be waterproof (concrete or similar), without cracks, polished, and leveled, facilitating cleaning and preventing infiltration into the underground. Preferably, a masonry barrier or obstacle should be built at the warehouse door to prevent spillage from carrying over outside the warehouse.

➢ **Management of Inputs and Agrochemicals Warehouses:**

- Promote the safe handling of products during their entry and exit from the warehouse, maintaining a daily report of this process (inventory control) and chemicals handling records (receiving, withdrawing, and inventory).
- Keep the Emergency Sheets for Transport (FE) and/or Material Safety Data Sheet (MSDS) for products stored in a suitable place (it is advisable to keep these sheets in easily acessible boards). The MSDSs must be available to interested parties, and the FEs must accompany the products in their transport.
- Observe the rules for packaging the products, ensuring that the agrochemicals are always kept in their original packaging.
- Maintain a circulation space. This space must have at least one central corridor facing the warehouse's main door and secondary corridors separating the various areas.
- In the event of an accident, inform the fire brigade, doctor, and hospital of the guidelines contained in the MSDS.
- Keep complete personal protective equipment in the warehouse for use in cases of emergency or leakage.
- Keep the first aid kit in an identified place. It is necessary to have people with first aid training able to properly use the material.
- Do not leave products obstructing people access near doors, circulation spaces, and in front of fire extinguishers.
- Access to the agrochemicals warehouse should only be allowed to trained operators, using appropriate personal protective equipment, and to perform work activities;
- Doors must remain locked to prevent the entry of children, animals, and unauthorized people.
- Packagings must be placed on pallets, avoiding contact with the floor. Batteries must be on a stable stack and kept away from walls and the ceiling.
- Do not store agrochemicals near food, animal feed, seeds, or medicines.
- They must be stored separately by type (herbicides, insecticides, fungicides, etc.).
- Flammable products will be kept in a ventilated place, protected against sparks and other sources of combustion.
- All products must be kept in their original packaging. After partial removal of the contents, the packages must be resealed.
- Never store product remains in packages without lid, leaking, or without identification.
- If packages are damaged, they should be covered with transparent plastic whenever possible to prevent product spillage. It is important that the label remains visible to the user at all times.

➢ **Safety and warning signs**

Safety and warning signs must be visible. Some examples of safety and warning signs are:

- Agrochemicals warehouse
- No access for unauthorized persons
- No smoking
- Danger - Poison
- Escape routes and emergency exits
- Containers for waste collection (solid and absorbed liquid wastes)
- Fire extinguishers (according to the fire department standard)
- No eating or drinking
- Fertilizer warehouse
- Waste disposal
- Fertilizer warehouse
- Recyclable and non-recyclable waste storage
- Emergency shower
- Hazardous waste storage
- Agrochemicals empty packaging storage
- Paper
- Glass
- Plastic
- Non-recyclable
- Danger - Agrochemicals

➢ **First Aid**

If poisoning or more serious situations occur, the victim should be transported to a medical center. Additionally, all information regarding the product involved in the accident must be collected (MSDS - Material Safety Data Sheet).

➢ **Leakage**[16]

Leakage in tanks primarily happens when packages are displaced or when agrochemicals are mishandled. Thus, it's crucial to ensure that opened packages are securely capped after use. Additionally, packaging should undergo inspection upon arrival and periodically for leaks and other damage. Any alterations in both packaging and products should prompt separation for subsequent treatment and/or disposal.

In cases of leaks, the following measures must be taken:

- Suspend the activity immediately.
- Ensure that unauthorized persons, children, and animals are kept away from the affected area.
- Follow the safety and emergency measures outlined in the product label instructions and emergency sheets provided by the manufacturer and/or MSDS.
- Wear appropriate personal protective equipment (PPE), such as gloves, boots, glasses, filter masks, and aprons.
- Prevent further leakage by securely closing the containers or adjusting their position to halt the leak.
- If it is impossible to maintain the products in their original packaging due to extensive damage, they should preferably be transferred to another empty packaging of the same product to prevent confusion with food containers or other agrochemicals. Ensure that these packages are securely closed and labeled with the original product label in a visible place. Alternatively, if this isn't feasible, use an accurate copy that includes the product's identification, toxicological class, and recommended doses. It's important to note that these emergency packages should not be repurposed for any other use.
- Neighboring packages thoroughly inspected and separated for cleaning if they are contaminated.
- Identify and store the containers used for collecting waste, along with products unsuitable for use, damaged, or unused packaging, in secure locations for later appropriate disposal.
- Once the situation is under control, conduct a comprehensive decontamination of all affected areas following the manufacturer's instructions. Avoid using water for washing or cleaning.
- Contaminated material resulting from the cleaning process should also be stored in sealed containers in a secure location and clearly labeled (at least with the trade name of the product and its specifications) for safe disposal.

[16]NOTE: Although accidents/incidents are not conceptually treated in Brazil as environmental impacts (but as environmental risks), this program lists leakage response measures as an integral part of chemical management.

12.1.4.4.2.1. Additional Considerations for Chemicals Management

This program lists the measures and procedures for the correct and adequate management of chemicals. Furthermore, it is relevant to mention that the company conducts Environmental and Social Risk Analysis (ARAS) for each of the agrochemicals used to combat unwanted pests and insects in the operation of Project Alpha. These are identified by name and brand, respectively:

- ARAS - Bendiocarb - Ficam VC
- ARAS - Deltametrina - K-Othrine
- ARAS - Glifosato Sal de Amônio Scout
- ARAS - Imidacloprido - Bamako, Evidence, Imaxi and Warrant (700 WG)
- ARAS - Isoxaflutol - Fordor 750 WG
- ARAS - Sulfluramid - Atta Mex S, Dinagro S and Mirex-S2
- ARAS - Triclopir-butotílico - Garlon 480 BR and Sector

12.1.4.5. Material and human resources

Material Resources

- Transportation provider
- Graphic materials for training purposes
- Office supply
- Field equipment (computer, GPS, camera, etc.)
- Safety equipment

Human Resources

- Internal team trained for every waste management procedure
- Team in charge of the operation
- Qualified team for waste and chemicals transport

12.1.4.6. Environmental indicators

As indicators of the Solid Waste and Chemicals Management Program, the following will be verified:

- Percentage of waste reused/recycled compared to the total collected.
- Generation of external jobs inherent in waste management operations.

- Percentage of waste properly disposed of for regularization purposes.
- Photographic records and national and international certificates proving good practice in the storage, handling, and use of agrochemicals and other chemicals.
- Photographic records and reports duly certified by a competent team that prove the application of measures provided for in this Environmental Program and in the Environmental and Social Risk Analysis (ARAS) for all agrochemicals used at Project Alpha.

The monitoring will be daily, with generation of monthly reports and an annual compilation of the program. The results will be submitted to the company project's management team.

12.1.4.7. Stages of the enterprise

This Program will be implemented during the implementation and operational phases of Project Alpha.

12.1.4.8. Implementation timeline

The following table presents the schedule for the Solid Waste and Chemicals Management Program. The program must be implemented throughout existence of the enterprise. All measures and procedures described must be consistently applied and practiced.

Table 12-12 - Schedule for the Solid Waste and Chemicals Management Program.

Activities	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Training and raising awareness of workers												
Waste identification												
Waste collection and segregation												
Packaging, storage, control, and use of chemicals												
Packaging, storage, collection, control, and final disposal												
Issuance of report												

12.1.4.9. Recording and tracking systems

Monthly reports will be generated and an annual compilation of the program will be prepared. The results will be submitted to the company project's management team.

12.1.4.10. Responsibility for the implementation

The Solid Waste and Chemicals Management Program will be implemented by the entrepreneur, with actions of individual and collective responsibility, as outlined in this program. It is important to mention that all companies providing services to the company must also have environmental certificates and operating licenses, as well as adhere to the outlined in the IFC guidelines and the company's Work Instructions.

12.2. BIOTIC ENVIRONMENT

12.2.1. Program for Flora Recovery, Restoration and Monitoring, and Invasive and Exotic Species Eradication

12.2.1.1. Description

Flora monitoring plays a crucial role in understanding and conserving plant biodiversity within a specific area (DE AZEVEDO, 2017). It enables the identification of species, their distribution, abundance, diversity, and dynamics, along with factors influencing these aspects. Additionally, flora monitoring can detect alterations in vegetation resulting from human activities or natural events, allowing for the assessment of their impacts on the ecological balance and environmental quality of the site.

12.2.1.2. Objective

According to Santos (2002), among the aspects that can be monitored in flora are: the fragmentation of forest remnants and their consequences for connectivity and loss of species; the availability of habitats for fauna and flora; the behavior of natural regeneration and the presence of invasive or exotic species that can compete or harm native species; floristic and phytosociological assessments, which provide information on the composition, structure, and function of vegetation; the edge effect, which results from the exposure of forest fragments to light, wind, and rain, and which can alter microclimatic conditions and vegetation dynamics; among others. Thus, flora monitoring can provide relevant data for understanding the current situation and trends of vegetation in the study area, as well as for the planning and implementation of conservation, recovery, or management measures of flora.

12.2.1.3. Mitigation, improvement or compensatory measures to be adopted

The implementation of this program will serve as a mitigation measure, aiming to reduce the presence of exotic species and monitor the progression of a pasture area into natural vegetation.

12.2.1.4. Methodology

For Vibrans (2010), one of the methods for conducting flora monitoring is through floristic inventories, which involve identifying and quantifying plant species present in a given location. These inventories provide insight into the composition, structure, and diversity of the flora, as well as facilitate the detection of potential changes caused by anthropic or natural factors. Furthermore, flora monitoring may incorporate the use of ecological indicators such as biomass, primary productivity, leaf area index, and phenology, which reflect the functioning of plant ecosystems and their responses to environmental changes. Additionally, flora monitoring may encompass the observation of important ecological processes like natural regeneration, seed dispersal, pollination, and herbivory, which influence the dynamics and conservation of flora. Therefore, flora monitoring enables the assessment of environmental impacts in the study area through analysis, measurements, and specific data collections that aid in understanding area conservation.

12.2.1.5. Material and human resources

For the implementation of this program, a team consisting of a biologist specialized in botany, a forest engineer, or an agronomist will be required, in addition to a field assistant.

The following **Table 12-13** lists the basic materials necessary for the implementation of the program.

Table 12-13 – Durable and consumer goods necessary for the implementation of the Program for Flora Recovery, Restoration and Monitoring, and Invasive and Exotic Species Eradication

Materials	
Durable goods	Laptop
	Photographic camera
	GPS
	Trimmer
	Sheathed machete
	Thermos water bottle
	Flashlight
	Clipboard
	Measuring tape 50 m
Consumer Goods	Field sheets
	Office Supplies

Materials	
	AA, AAA and D batteries
	Zebra Marking Tape

12.2.1.6. Environmental indicators

The indicators of this program include:

- Total richness
- Total abundance
- Total frequency
- Phytosociology
- Timber and native forest tree volume
- Proportion of altered area versus natural area
- Presence of epiphytes
- Proportion of native understory coverage

12.2.1.7. Stages of the enterprise

The program aims to verify the gradual change of landscape and forest typology. Therefore, it is recommended that a campaign be conducted before the planting is started, for background or baseline purposes.

In the operational phase, given that the growth process of forestry (and its respective first two cycles of timber harvesting and replanting) and forest recomposition take years, there is no need to conduct campaigns with quarterly seasonality. It is suggested that an annual campaign be carried out every two years, considering the first 14 years of operation.

12.2.1.8. Implementation timeline

The following is the suggested schedule for the implementation of the Program for Flora Recovery, Restoration and Monitoring, and Invasive and Exotic Species Eradication.

Table 12-14 – Implementation timeline of the Program for Flora Recovery, Restoration and Monitoring, and Invasive and Exotic Species Eradication

Activity	Pre-planting	Year 1	Year 2	Year 3	Year 4
Planting start					
Campaign					

Activity	Pre-planting	Year 1	Year 2	Year 3	Year 4
Report					

Activity	Year 5	Year 6	Year 7	Year 8	Year 9
Planting start					
Campaign					
Report					
Activity	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**
Planting start					
Campaign					
Report					

12.2.1.9. Recording and tracking systems

A report must be prepared for each campaign, consolidating data from the current campaign alongside data from the previous campaigns. Each report must contain:

- A list of recorded species, highlighting the new records from the current campaign.
- Observed richness, frequency and abundance of the target species, comparing the results with previous campaigns.
- Comparative analysis of the results between the various habitats present in the project, including natural, modified and, if any, those considered critical.
- Progression of the results of the phytosociology and floristic survey of the herbaceous-subshrub layer.

12.2.1.10. Responsibility for the implementation

The company is responsible for the implementation of this program and may consider hiring an outsourced team for its feasibility.

12.2.2. Fauna Rescue and Fleeing Program

12.2.2.1. Description

To minimize potential impacts on the local fauna, we developed the Wildlife Removal and Possible Rescue Program. This program aims to ensure the safety and well-being of wild animals during various operations, including area cleaning, the use of machinery and vehicles, and increased workforce presence.

Our terrestrial fauna management actions concentrate on reducing the risk of accidents involving animals and ensuring the appropriate handling of captured specimens at Project Alpha.

Management activities will target amphibians, reptiles, birds, as well as small, medium, and large terrestrial mammals and bats. It is important to note that for large terrestrial mammals, captures and collections will only occur in cases of motor difficulty or when individuals are found deceased. In most cases, species will be directed to areas with low risk to individual survival to preserve their lives and habitats.

Capturing animals should be avoided as much as possible, and preference should always be given to scaring them away. Animals should only be rescued in the following cases: risk of death; inability to move, species that pose a risk to construction workers or when they are injured.

It should be considered that the Project Alpha area has an anthropic phytophysionomic matrix, with a predominance of pasture areas. The native forest areas present, which are more likely to harbor wildlife individuals, will not be subject to vegetation suppression. Therefore, it is not considered necessary to establish a Wildlife Removal and Possible Rescue Program in traditional formats. This is because the likelihood of wildlife encounters will be low, as well as the likelihood of recording specimens with injuries caused by area cleaning.

12.2.2.2. Objective

The main objective of the Wildlife Removal and Possible Rescue Programis to reduce loss and death of terrestrial wildlife due to the implementation process of reforestation and forestry activities at Project Alpha.

The specific objectives of the program are:

- Minimize possible direct impacts on the fauna in the operational area of the project.
- Ensure appropriate handling of debilitated wildlife specimens.
- Ensure appropriate handling of deceased wildlife specimens.
- Collaborate with the maintenance of good Occupational Health and Safety (OHS) practices.
- Assist in the collection of evidence regarding the occurrence of terrestrial fauna in the area.

12.2.2.3. Mitigation, improvement or compensatory measures to be adopted

The implementation of the Wildlife Removal and Possible Rescue Program will serve as a mitigation measure for two environmental impacts identified for the wildlife in the implementation phase of the Project:

- Disturbance and Wildlife Removal
- Loss of wildlife individuals due to stress, run-over, and hunting

The methodology for implementing the program is described in the following item.

12.2.2.4. Methodology

Prior to the beginning of cleaning activities, planning for the works and actions must be undertaken, particularly considering the guidelines for vegetation cleaning activities. This is to ensure a safe, directed activity that guarantees the passive removal of fauna without the need for handling and/or rescue. This stage will aim to identify, based on previous work, the most effective cleaning system and to redefine the working method if necessary. Additionally, at this stage, the necessary machinery, equipment, and the required number of workers must be provided for each work area.

In this pre-cleaning step, the following actions must be considered and evaluated:

- Assessment of general characteristics of the area.
- Field demarcation of the target area.
- Definition of procedures for vegetation cleaning, taking into account the topographical characteristics of the terrain, the presence of physical obstacles, remaining forests for the dispersion of fauna, and existing access points.

Prior to the beginning of cleaning activities in the planned areas, an outsourced employee should inspect the entire area to identify the presence of nests and hives of bees, wasps, and hornets. Identifying these points is crucial for the safety of workers at the site. Once identified, the responsible individual for the area should be informed so that the best strategy can be defined in collaboration with the socio-environmental and health and safety teams. The entire stage of activity implementation will be monitored by a qualified professional with experience in fauna management, who will be readily prepared to oversee the entire process within the enterprise implementation area.

As previously stated, considering the vegetation cover that will undergo management, the likelihood of encountering wildlife and the probability of accidents causing injuries wildlife are considered low.

Therefore, the following basic guidelines should be followed during the pasture cleaning process:

1) All professionals will undergo training focusing on the importance of wildlife conservation.
2) Upon encountering any wildlife specimen, employees will be trained to assess whether the individual is healthy or not.
3) In the case of healthy individuals, employees will drive the animals away to adjacent areas, allowing the wildlife to disperse naturally.
4) For the displacement process, employees will be trained not to touch the individual, but instead to act in a way that causes stress to the animal (throwing stones, branches, etc.).
5) If it is determined that the animal is not moving or appears to be injured, the team will contact a veterinarian from an affiliated clinic for rehabilitation and subsequent release.

12.2.2.5. Material and human resources

Considering the activities performed, it is not expected that many rescue activities will be necessary. Thus, it is suggested that the team consist of a biologist and a field assistant. For veterinary care, if needed, an agreement must be made with a veterinary clinic in one of the three nearby municipalities.

Table 12-15 lists the basic materials necessary for the implementation of the program. No veterinary drugs were listed, as any required care will be provided in an affiliated clinic.

Table 12-15 – Durable and consumer goods necessary for the implementation of the Wildlife Removal and Possible Rescue Program

Materials	
Durable Goods	GPS
	Photographic camera
	Machete with sheath
Consumer Goods	AA, AAA and D batteries

12.2.2.6. Environmental indicators

The program's environmental indicators are:

- Number of scare-away actions conducted.

- Number of captures and immediate releases made.
- Number of captures and releases made after veterinary treatment (individuals with physical injuries).
- Number of captures made for individuals that cannot be returned to the wild (need to be sent to the Wildlife Rehabilitation Center – CETAS – or euthanized).
- Number of collections of deceased individuals.

12.2.2.7. Stages of the enterprise

This program will be carried out exclusively during the implementation phase of Project Alpha, during which actions will be undertaken to clear the land for planting and heavy machinery will be used. Following this phase, the program will be phased out.

12.2.2.8. Implementation timeline

The program will be implemented during the implementation phase.

12.2.2.9. Recording and tracking systems

Once the implementation phase is finished, a final report will be prepared, comprising at least the following information:

- List of all species recorded in scare or capture activities.
- Percentage of chase and capture by faunal group.
- Number of scare-away actions conducted.
- Number of captures and immediate releases made.
- Number of captures and releases made after veterinary treatment (individuals with physical injuries).
- Number of captures made for individuals that cannot be returned to the wild (need to be sent to the Wildlife Rehabilitation Center – CETAS – or euthanized).
- Number of collections of deceased individuals.

12.2.2.10. Responsibility for the implementation

The company is responsible for the implementation of this program and may consider hiring an outsourced team for its feasibility.

12.2.3. Fauna as an Indicator of Environmental Quality Monitoring Program

12.2.3.1. Description

This program aims to provide information and support for Performance Standard 6, which specifically addresses biodiversity conservation. Fauna assessments conducted at Project Alpha have identified certain species deserving of attention, either because they are threatened with extinction or because they serve as indicators of environmental quality.

This program will focus on the endangered species registered at Project Alpha (see item 7.2.3.5). It is worth noting that these species were chosen to comply with Performance Standard 6, 'Biodiversity Conservation and Sustainable Management of Living Natural Resources'.

12.2.3.2. Objective

Considering that the planning for Project Alpha includes the replacement of the pasture plant matrix with native forest areas and forestry areas, the Fauna Monitoring Program is proposed as an Environmental Quality Indicator. Its main objective is to verify whether the landscape change at Project Alpha will increase the number of indicator species (bioindicators), as well as their respective abundances and frequencies in the territory, thereby promoting an area for the use of these species.

12.2.3.3. Mitigation, improvement or compensatory measures to be adopted

The implementation of the Fauna as an Indicator of Environmental Quality Monitoring Program will serve as a monitoring measure of the positive environmental impact identified for the fauna during the operational phase of the project:

- Increase in Wildlife Habitat (considering Performance Standard 6, 'Biodiversity Conservation and Sustainable Management of Living Natural Resources').

The methodology for implementing the program is described below.

12.2.3.4. Methodology

- **Selection of Sample Areas**

Since the program plans to verify changes in faunal communities in response to plant recovery and the conversion of pasture areas to forestry, it is proposed that monitoring be carried out in nine sample areas listed below. The nine sample areas will be selected to cover areas with and without nearby water courses, also considering the ease of access by the team.

- Three areas in the preserved portion of the Legal Reserve (control areas).
- Three areas of pasture converted into forestry.
- Three areas of pasture converted into forest preservation areas.

- **Avifauna Methodology**

Only non-interventional methodology will be used for bird monitoring. Each of the nine areas will be sampled by means of a 1,000-meter-long transect. Every 200 meters, the biologist will remain still and record all species observed (including number of individuals) and heard, for a period of 10 minutes. These transects will be traversed in the early morning (5 am to 10 am) and evening (6 pm to 8 pm). Thus, each transect will have a total of six sampling points, with 120 minutes sampled (60 minutes in each shift). All data will be recorded on field cards, and whenever possible, specimens will be photographed.

In addition, any birds viewed or heard while the team moves between sample areas will also be recorded as qualitative data.

- **Mastofauna Methodology**

Two non-interventional methodologies will be used for mastofauna monitoring. A camera trap will be installed in each of the sample areas. The camera traps will remain active for a period of five days. Subsequently, all captured material will be sorted, and the species identified in the office. Since the purpose of monitoring is to verify whether the converted pasture areas are attracting fauna, it is not recommended to use baits in front of camera traps, so as not to affect the results.

In addition to the use of camera traps, the areas will be sampled using an active search methodology. The biologist will tour each area for one hour during the day and one hour during the night, searching for evidence of fauna such as footprints, feces, scratches, burrows, hair, etc. Thus, in each area, a two-hour effort will be carried out, totaling 18 hours per campaign. All data will be recorded on field cards, and whenever possible, specimens will be photographed

In addition, any mammals viewed or heard while the team moves between sample areas will also be recorded as qualitative data.

- **Data analysis**

It is recommended that each campaign includes the following analyses, at a minimum:

- Total and relative species richness per point
- Total and relative frequency per point
- Total and relative species abundance per point
- Shannon's diversity (by campaign and by point)
- Evenness (per campaign and per point)
- Dominance
- Jacknife's rarefaction curve
- Similarity clustering

12.2.3.5. Material and human resources

For the implementation of this program, a team composed of a biologist specialized in ornithology, a biologist specialized in mastozoology, and a field assistant will be required.

The following is a list of the basic materials necessary for the implementation of the program.

Table 12-16 – Durable and consumer goods necessary for the implementation of the Fauna as an Indicator of Environmental Quality Monitoring Program

Materials	
Durable goods	Laptop
	Binoculars
	Photographic camera
	GPS
	Camera trap
	Machete with sheath

Materials	
	Insulated water bottle
	Flashlight
	Clipboard
	50-meter measuring tape
Consumer Goods	Field sheets
	Office supplies
	AA, AAA and D batteries
	Zebra floor marking tape

12.2.3.6. Environmental indicators

The program's environmental indicators are:

- Total species richness
- Total species abundance
- Total frequency
- Shannon’s diversity index
- Evenness
- Presence/absence of the selected species
- Increased/decreased frequency and abundance of selected species
- Presence of other endangered, endemic or rare species

12.2.3.7. Stages of the enterprise

The Fauna as an Indicator of Environmental Quality Monitoring Program aims to verify changes in the faunal community in response to the changing landscape at Project Alpha. Therefore, it is recommended that a campaign be conducted before the planting is started, for background or baseline purposes.

In the operational phase, given that the growth process of forestry (and its respective first two cycles of timber harvesting and replanting) and forest recomposition take years, there is no need to conduct campaigns with quarterly seasonality. It is suggested that two semiannual campaigns be carried out every two years, considering the first 15 years of operation.

12.2.3.8. Implementation timeline

The following is a suggested schedule for the implementation of the Fauna as an Indicator of Environmental Quality Monitoring Program.

Table12-17– Timeline for implementation of the Fauna as an Indicator of Environmental Quality Monitoring Program

Activity	Pre-planting		Year 1		Year 2		Year 3	
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2
Planting start								
Campaign								
Report								

Activity	Year 4		Year 5		Year 6		Year 7	
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2
Planting start								
Campaign								
Report								

Activity	Year 8		Year 9		Year 10		Year 11	
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2
Planting start								
Campaign								
Report								

Activity	Year 12		Year 13		Year 14		Year 15	
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2
Planting start								
Campaign								
Report								

12.2.3.9. Recording and tracking systems

A report must be prepared for each campaign, consolidating data from the current campaign with data from the previous campaigns. Each report must contain:

- A list of recorded species, highlighting the new records from the current campaign.
- Observed richness, frequency and abundance of the target species, comparing the results with previous campaigns.
- Comparison of results between sample areas (control/Legal Reserve, forestry and native forest recovery).
- Shannon's diversity index and Evenness.
- Rarefaction curve.
- Record of endangered, endemic, and rare species; as well as indicators of environmental quality and economic importance (*xerimbabo* – wild animal raised as a pet, game animals, and human-wildlife conflict).

12.2.3.10. Responsibility for the implementation

The company is responsible for the implementation of this program and may consider hiring an outsourced team for its feasibility.

12.3. SOCIO-ECONOMIC ENVIRONMENT

12.3.1. Corporate Communication Program (CCP)

12.3.1.1. Description

The demand for a Corporate Communication Program (CCP) derives from the need to establish efficient communication between the enterprise and the social groups located in the area of influence of the Project Alpha. The enterprise's commitment to the affected population must be demonstrated through actions of social and corporate responsibility, based on ethics and environmental sustainability.

An efficient and effective communication program must incorporate the ability to mediate communication with stakeholders involved in the phaseout, implementation, and operation. Initially, the CCP should clarify the scope of the activity and its expected outcomes with the resident population and other stakeholders in the affected region. To achieve this, the program should establish organized and systematic mechanisms for interaction with stakeholders and society, aimed at understanding stakeholder demands, mitigating latent conflicts, and informing stakeholders about interventions and measures adopted to prevent, mitigate, or compensate for the program’s negative impacts, while promoting and enhancing positive impacts. It is essential for the CCP to employ clear and accessible language tailored to all audiences, while also respecting the socio-economic realities of the environment in which the activity is implemented.

12.3.1.2. Objective

Establish a two-way communication and communication process between the company and key stakeholders throughout the phaseout, implementation, and operational phases. This initiative aims to foster interaction and meaningful participation among all involved parties. Such communication will enhance stakeholder understanding of the project, expand community knowledge, and facilitate the comprehensive dissemination of project information. This ensures that both directly and indirectly affected communities are informed about various aspects of the operational and environmental management of the activity.

The specific objectives of the program are as follows:

- Clearly disseminate information about the eucalyptus forest planting and management operation, environmental impacts, mitigation and compensatory measures, and Environmental Programs. This will be achieved through the establishment of communication channels and mechanisms for community participation, aiming to prevent false expectations, speculation, insecurity, and instability regarding the project within local communities.
- Manage and reconcile information arising from the activity inherent to the gradual termination of workers from the primary activity, if applicable, as well as implementation, operation, and disposal of goods. This involves the necessity for communication and interaction with the affected population and/or buyers.
- Utilize the media as a tool for the dissemination of pertinent information at each stage of the activity.

12.3.1.3. Mitigation, improvement or compensatory measures to be adopted

The following are considered mitigation measures and goals of this program:

- Provide program communication channels – telephone (WhatsApp channel) and email.
- Produce and distribute social communication material to public institutions in Figueirão, Camapuã, and Costa Rica to disseminate the stages of the implementation activity.
- Produce and distribute social communication material to the ADI communities involved in the implementation.
- Distribute communication material to all stakeholders seeking implementation information, including civil society organizations, the scientific community, local media, among other partners and/or social actors.
- Inform all program audiences of changes in local daily life related to implementation activities with direct impacts, as well as mitigation measures.
- Disseminate information on the progress and evolution of the environmental control program in language appropriate for the target audiences, ensuring that society is constantly informed.

12.3.1.4. Methodology

The Corporate Communication Program will have the following target audience:

- Residents of ADI communities.

- Associations, representative entities, and community leaders of ADI.
- Camapuã, Figueirão and Costa Rica's city administration, as well as local secretariats.
- Project workers.
- Workers involved in the primary activity.
- Buyers responsible for the flow of collected material.
- Media channels and newspapers.

The methodology guiding the development of communication actions presupposes the identification and mapping of audiences, establishing various mechanisms and instruments of information tailored to each group. This approach aims to reach different segments of interest and foster dialogue, facilitating effective communication between the enterprise, government institutions, workers, and the community, including their political and social representatives. To this end, the Engagement Plan (TETRA TECH, 2023) already contains a list and qualifications of the main stakeholders mapped in the areas of influence, enabling the adoption of various forms of interaction.

The accurate identification of groups and their social and cultural characteristics is one of the main factors guiding the definition of communication strategies. These strategies should prioritize the engagement of multiplier agents to expand and facilitate interaction between the entrepreneur and the target audience.

The methodology employed in this program aims to establish interactive relationships based on the principles of horizontality, transparency, ethics, and territorial focus. The primary social actors related to the enterprise (interest groups) will be compiled into a database, which must be regularly updated to facilitate ongoing dialogues with the enterprise. Consequently, relationship and positioning tools should also be continually reviewed.

With the aim of maintaining dialogue with the population to channel and resolve conflicts, a set of coexistence actions is to be implemented between the enterprise/developer, institutional agents, class associations, and the population. These actions can be based on the Engagement Plan (TETRA TECH, 2023), which provides a detailed report of the forms of interaction with stakeholders.

Considering the ongoing use of communication channels and dissemination tools, as outlined in the company's Disclosure and Communication Management Procedure (PG007), the following instruments will be used for the dissemination of matters related to the enterprise:

- Meetings with leaders or neighbors
- The company's website

- Presentations
- Technical visits

The communication materials used are folders and institutional summaries of the Management Plan. The communication tools already adopted by the company include:

- Space on the website
- Suggestion boxes
- E-mail address
- Hotline with the company: 0800 891 4636

In addition to the activities already carried out by the company, the following actions of interest to the local community were considered for the implementation of the Corporate Communication Program, as presented below:

- Maintenance of a direct communication channel and another channel for complaints.
- Creation of a Whatsapp group.
- Invitation to engagement – first contact.
- Conducting biannual visits.
- Graphic materials.
- Notice to buyers responsible for removing products.
- Phaseout meetings for the primary activity, if any.

A. Maintenance of the 0800 Communication Channel and Corporate Communication Channel Board

Currently, the company already maintains and operates the 0800 communication channel (ombudsman's office) for receiving and responding to questions, concerns, and demands from the community.

To ensure access to communication, information signs will be placed around the enterprise, displaying the contacts of the Communication Channel in a location that guarantees high visibility to passersby and vehicles, preferably in areas of heavy traffic and main entrances of the enterprise. The signs must prominently feature the email, telephone, and information contacts for the Communication Channel service, along with the name of the enterprise and the responsible company.

B. Creation of a Whatsapp group

The region where Project Alpha is located currently lacks telephone signal; however, there is an internet signal available to residents. As indicated in the diagnosis, it was found that all interviewed residents inform and communicate with each other through WhatsApp. In fact, it was reported that there is a group on the application comprising residents around Project Alpha, as well as professionals from outsourced companies responsible for implementing the company's current communication plan. According to the interviewed residents, the group is effective and facilitates ongoing dialogue among residents.

In addition, during the interviews, most of the respondents expressed uncertainty about the nature of the eucalyptus planting activity, fearing changes in water availability and the influx of new residents to their areas.

To address this concern, it is proposed to create a WhatsApp group that allows for the exchange of information and direct, periodic contact between the company and residents around the enterprise, with a focus on neighboring residents who rely on water from springs in the region. This channel will also serve as a means of information dissemination, with periodic sharing of graphic materials.

It's important to highlight that messages forwarded via a WhatsApp group or any other application are formatted and cannot be edited, ensuring the integrity of the content and preventing alterations.

C. Invitation to engagement – first contact

For this initial phase, it is advisable to arrange individual meetings with all identified stakeholders to facilitate personalized approaches and negotiations. Consequently, individual, personalized invitations should be sent in advance, containing:

1. The purpose and scope of engagement.
2. Schedule.
3. Expected contribution from stakeholders.
4. Benefits for stakeholders invited to participate.
5. Additional required information.
6. Next steps.

Meetings must be scheduled based on the availability of guests and on suitable locations. During these meetings, other informative materials will be distributed, always aiming for accessible language and keeping technical details to a minimum for better understanding of the project and the engagement process.

The purpose of this initial meeting is to formally present the project by a company representative. Additionally, the meeting should address key concerns regarding water, transportation, and safety, and foster an open dialogue where attendees feel comfortable asking questions and providing comments.

D. Conducting biannual visits

During these meetings and visits, the strategic role of the enterprise as an instrument for local and regional development will be emphasized. Ensuring broad and timely access to information about the enterprise will guarantee the participation of the population, especially those directly affected, throughout all phases of activities, thereby contributing to the minimization of socio-environmental impacts.

The priority target audience should be the neighboring residents within the territory of Project Alpha, as well as within communities in ADI and AII, and public authorities, primarily in Figueirão. For isolated properties or those not part of the two communities in the area of influence of this study, individual visits will be conducted every six months. The primary focus of these meetings should be to disseminate information about the project, discuss actions taken to mitigate impacts, and provide an open forum for listening to complaints, questions, and suggestions from the community.

These meetings should always be scheduled on days and times that enable the participation of the general public. They should have an average duration of 1 hour and 30 minutes and be conducted by a company professional. Invitations must be sent one week in advance.

E. Graphic Materials

Graphic materials provide the foundation for building strong stakeholder engagement. They should briefly address:

- Information about the project.
- The nature of the problems and the associated risks and opportunities.
- How problems are currently managed in the organization.

- The policies and systems already in place.
- What the company is able and intends to do about to the problems.

In addition, updated materials that include additional guidelines, such as actions taken to mitigate impacts, must be prepared bi-monthly. These materials should be interactive and didactic in nature, making them easy to understand for all types of audience.

They should be made available in a fixed location for free access and presented at all community meetings and leisure areas. Additionally, they should be transmitted in digital format through WhatsApp.

F. Notice to buyers responsible for removing products

The buyers, who are responsible for the flow of the commodities, need to be briefed on the territory, designated routes, and key points of attention. Additionally, it's crucial to convey the necessary procedures for mitigating potential impacts on those who utilize or reside near the road, such as reducing speed to prevent accidents and minimizing dust dispersion.

This communication must always take place when when the buyers are scheduled to gather the eucalyptus timber from the farm. It can be carried out via email, ensuring confirmation and acknowledgment of the information provided, or via online meetings.

G. Phaseout meetings for the primary activity, if any

For the sake of ethics and transparency in negotiations, when a primary activity in the territory is to be phased out to start another one, all workers must be made aware of the transition from the closing down of one activity to the mobilization of the next. For this, it is necessary to hold face-to-face meetings with the workers to identify and explain how the dismissal will take place, and the possibility, if any, of retaining the workforce. These meetings must occur monthly until the end of the activity.

12.3.1.5. Material and human resources

To implement the Corporate Communication Program, a team will consist of environmental technicians, socio-environmental technicians, communication specialists, and a designer.

12.3.1.6. Environmental indicators

For the evaluation and monitoring of the activities carried out in the Corporate Communication Program (CCP), regular reports will be generated.

The CCP presents the following indicators:

- Number of participants in face-to-face meetings.
- Number of complaints regarding the implementation and operation of the enterprise.
- Number of solutions found for verified problems.

12.3.1.7. Stages of the enterprise

The Corporate Communication Program must be implemented during the implementation and operational phases of the enterprise.

12.3.1.8. Implementation timeline

The Corporate Communication Program will take place throughout the period of mobilization, implementation and operation of the activity, according to **Table 12-18**.

Table 12-18 - Schedule of the Corporate Communication Program

Activities	1st Year / Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Maintenance of a direct communication channel and another channel for complaints												
Creation of Whatsapp group												
Invitation to engagement – first contact												
Conducting biannual visits												
Graphic Materials												
Notices to buyers responsible for removing products												
Phaseout meetings for the primary activity, if any												

12.3.1.9. Recording and tracking systems

Every six months, a report will be prepared containing at least the following information:

- Number of actions taken by the company.
- Number of interactions per established communication method.
- Number of positive (compliments), negative (complaints), and neutral (clarification of doubts) interactions.
- Analysis of interactions by territory and communities.
- Analysis of the effectiveness of the communication methods.

12.3.1.10. Responsibility for the implementation

The company will be responsible for implementing the program in collaboration with the company contracted for its implementation.

12.3.1. Environmental Education Program (EEP)

12.3.1.1. Description

The Environmental Education Program (EEP) is an important tool for awareness-raising processes and for seeking to change attitudes and behaviors in relation to the environment, aiming to improve environmental quality and, consequently, the population's quality of life.

According to Law No. 6.938/81, which establishes the National Environmental Policy (PNMA), the environment is the ‘set of conditions, laws, influences, and interactions of a physical, chemical, and biological order, which allows, shelter and govern life in all its forms.’ According to article 225 of the Federal Constitution:

> *Art. 225. All have the right to an ecologically balanced environment, which is an asset of common use and essential to a healthy quality of life, and both the Government and the community shall have the duty to defend and preserve it for present and future generations. (BRAZIL, 1998 Federal Constitution)*

As it is our duty to defend and preserve the environment for present and future generations, it is necessary to build social values, knowledge, skills, attitudes, and competencies aimed at the conservation of the environment, a common good of the people essential to a healthy quality of life and its sustainability, as recommended in Article 1 of the National Environmental Education Policy (BRAZIL, Law No. 9795/99).

This can occur in an informal teaching-learning process that enables the social groups involved to acquire knowledge, skills, and citizenship attitudes towards the themes and socio-environmental problems that characterize their reality.

According to Layrargues, the promotion of environmental education through the resolution of local environmental problems carries highly positive value, as it avoids the tendency of perceiving global problems as distant from local reality and assumes that citizen participation in organizing and managing their environment and daily life goals is indispensable (LAYRARGUES, 2001 apud TOZONI-REIS, 2005).

Thus, this EEP occurs within the scope of compensatory and mitigation measures for the impacts identified in the implementation and operational phases of the eucalyptus plantation at Project Alpha.

12.3.1.2. Objective

The general objective of the program is to facilitate the understanding of the strategic role of the forest planting and management project and to raise awareness among the actors in the ADI, aiming for behavioral changes that contribute to improving the quality of life of the communities in the area covered. The Environmental Education Program (EEP) aims to promote the construction of social values, knowledge, skills, attitudes, and competencies aimed at conserving the environment among all target audiences.

Thus, the following specific objectives were determined through the actions structured by the target audience:

- **Collaborators:** Daily Environmental Dialogue (DED)
  - Enlighten the workers involved in the operational activity about the potential environmental impacts on the area of influence and the environmentally appropriate procedures.

- **Communities:** Workshops, Conversation Circles, and distribution of graphic materials.
  - Improve the relationship between the ADI communities and the company.
  - Strengthen sustainable community practices.

- **Schools:** Environmental Education Booklet
  - Encourage the dissemination of information on environmentally sustainable practices to stakeholders within the ADI.

12.3.1.3. Mitigation, improvement or compensatory measures to be adopted

The Program's measures and actions are:

- Daily Environmental Dialogues (DEDs) with employees during the implementation and operational phase of the project.
- Workshops and conversation circles for each stakeholder group, as needed and according to the agenda of the responsible team.
- Distribution of printed and digital graphic materials on environmental education.
- Distribution of 500 copies of the Environmental Education Booklet within the ADI.

12.3.1.4. Methodology

The target audience of this program includes:

- **Internal audience:** direct and outsourced employees of the enterprise.
- **External audience:** government agencies, communities, and schools within the ADI.

The details of the Environmental Education Program actions are presented based on the target audience.

a) Collaborators: Daily Environmental Dialogue (DED)

The daily dialogues aim to incorporate into the workers' routine (both employees and outsourced personnel) instructions on safety, environmental, and health aspects related to their activities. Therefore, it is necessary for this action to occur daily throughout all phases of the enterprise.

During the DEDs, with a minimum duration of five minutes, topics concerning the environmental impacts and environmental control measures of the enterprise should be addressed, always before the start of work activities. It is suggested that employees take turns carrying out this action, being led and taught by different individuals, but always with the support of the Occupational Safety Technician and/or Environmental Technician.

The topics should be alternated and chosen according to the activities to be performed. For example, if the work involves sun exposure, it is suggested that the focus be on precautions related to this situation, such as guidance on the use of sunscreen, hats, and the importance of hydration.

Moreover, topics that the team considers relevant for the moment or in relation to the activities being developed and the risks involved, such as forest fires, contact with wild animals, and techniques for cultivation and soil care, may be addressed. The choice of subject will be free; however, below are some suggestions for content to be developed during the dialogues:

Concepts of environment and characterization of the region:

- Mitigation programs of the enterprise.
- Concept of Ecology.
- Wildfires.
- Contact with wild animals.
- Ecosystems of the region, biodiversity and environment.
- What sustainability is and how it applies to the enterprise.
- Fauna species in the region, agencies related to animal rehabilitation, fauna rescue actions.

Importance of communication with colleagues and their superiors:

- Rules for good coexistence.
- Asking questions.
- Knowing how to listen.
- Respecting personal space.
- Observing, evaluating, and taking action.

The importance of maintaining a good relationship with the community where you live:

- Understanding and exercising citizenship.
- Adopting a responsible attitude.
- Representing the company in the community.

b) Communities: Workshops, Conversation Circles and distribution of graphic materials

Through these actions, we aim to promote environmental awareness among members of nearby communities regarding issues relevant to the local environment. Workshops and conversation circles will be organized with each stakeholder group, addressing topics mapped to the local reality, such as eucalyptus and water, forest fires, waste disposal, domestic waste burning, and others. This dynamic may occur every six months at community support venues such as churches, schools, and associations.

Informative materials related to the themes discussed should be prepared and distributed at all meetings. Therefore, the models will be changed every six months.

c) Schools: Environmental Education Booklet

Focusing on the schools in Camapuã, Costa Rica, and Figueirão, as well as the communities of Santa Barbara and Santa Tereza, this project aims to disseminate concepts related to the environment and equip children to adopt a more sustainable lifestyle.

A booklet is ideally a collaborative endeavor, constructed through dialogue and the collaboration of multidisciplinary teams. This approach is preferred because it enables the integration of diverse knowledge, resulting in a holistic product. Conversely, if developed in a disciplinary manner, it risks presenting a fragmented perspective (FOLADORI, 2001; CAPRA, 2002; COIMBRA, J. 2004). Therefore, the methodology used in designing the booklet will be based on three stages:

(I) **Brainstorming** with students and teachers to support the definition of the main message and specific messages to be conveyed in the booklet. This method promotes the collective generation of new ideas through the participation of several actors in a group.

(II) **Definition of the main message and the specific messages to be transmitted** by the team responsible for preparing the booklet, defining the plot and texts that will compose it. One should opt for ideas that best fit the reality in question. The plot must be simple and accessible (easy to understand) to the target audience, reflecting their daily life and specific aspects.

(III) **Definition of scenarios and characters** by the team responsible for preparing the booklet in order to represent the main issues of the community in a clear and direct way. The speeches presented in the booklet must be succinct and use simple and appropriate language for the readers' level.

At the end of the design and graphic elaboration process of the booklet, the materials will be printed and distributed to educational institutions. On the day of material delivery, there should also be a playful moment of discussion and further exploration of the theme with the students. The action to disseminate the material must take place annually.

12.3.1.5. Material and human resources

The implementation of the Environmental Education Program involves the Environment, Community Relations, and Communication sectors. Therefore, it must be carried out by a multidisciplinary technical team composed of environmental technicians, socio-environmental technicians, educators, facilitators, communication specialists, and designers.

12.3.1.6. Environmental indicators

For the evaluation and monitoring of the activities carried out in the Environmental Education Program, reports will be generated, and the program presents the following indicators:

- Number of Daily Environmental Dialogues performed.
- Number of participants in the workshops and conversation circles.
- Number of schools involved.
- Number of children involved.

12.3.1.7. Stages of the enterprise

The Environmental Education Program will take place throughout the implementation and operational phases of Project Alpha.

12.3.1.8. Implementation timeline

The Environmental Education Program will take place throughout the implementation and operational phases of Project Alpha.

Table 12-19 - Schedule of the Environmental Education Program

Activities	1st Year / Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Collaborators: Daily Environmental Dialogue (DED)												

Activities	1st Year / Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Workshops and Conversation Circles												
Schools: Environmental Education Booklet												

12.3.1.9. Recording and tracking systems

Every six months, a report will be prepared containing at least the following information:

- Number of actions taken by the company.
- Attendance in workshops and conversation circles and subsequent interactions.
- Participation of the involved schools.

12.3.1.10. Responsibility for the implementation

The company will be responsible for implementing the program in collaboration with the company contracted for its implementation.

12.3.2. Socio-economic Indicators Monitoring Program

12.3.2.1. Description

The Socio-economic Indicators Monitoring Program (PMISE) is an instrument for monitoring socio-economic indicators capable of measuring the degree of impact of the enterprise on the municipality and the region (both positive and negative). The program serves an additional function: enabling the creation and expansion of public policies related to the addressed topics through participatory and collaborative methodologies, resulting in institutional arrangements for monitoring the area.

Specifically, the program should support the formulation of mitigation and compensatory actions to address the pressure on education, health, housing, sanitation, public security, and public transport systems. These actions can be structured based on the results obtained from the proposed monitoring activities. Therefore, the program is expected to contribute to the adoption of both public and private measures that will ensure the guarantee of basic rights and maintain the quality of life for the population.

The Socio-economic Indicators Monitoring Program seeks to systematically understand the effects of the company's operation on economic and social aspects in the municipalities within the areas of influence, especially in Figueirão.

It should be noted that the scope of variables and indicators monitored by the PMISE includes those that not only provide support for the environmental management of the enterprise but also facilitate the assessment of its socio-economic impacts. Consequently, this aids in adjusting the conduct and approaches of other environmental projects and programs.

12.3.2.2. Objective

The general objective of this program is to contribute with information that supports urban and socio-territorial planning, based on the monitored socio-economic indicators that track the evolution of the socio-economic dynamics of the municipalities within the area of influence.

Therefore, the application of this program is directly related to the increase in pressure on the municipality's community facilities, access infrastructures, and any anticipated population growth for the municipality. However, the principles and strategies adopted here characterize the monitoring process, aiming to comprehensively map the pressures that may arise, as well as the improvements in conditions resulting from the expansion of the enterprise's positive effects.

12.3.2.3. Mitigation, improvement or compensatory measures to be adopted

Based on the objectives proposed and indicated above for the Socio-economic Indicators Monitoring Program (PMISE), the following goals were established:

- Ensure the collection, systematization, and analysis of socio-economic data with periodic updating of the database.
- Monitor the socio-economic indicators that allow the identification, dimensioning, and evaluation of potential interferences linked to the activities of the enterprise on the social and economic dynamics, quality of life, and health conditions of the local population.
- Gather, systematize, and analyze the information related to the proposed socio-economic monitoring, compiled in Annual Reports to support the proposal of management measures, if necessary.
- Ensure access to the results of socio-economic monitoring to stakeholders, local population, and representatives of the city administration, contributing to increasing the level of information, engagement, and awareness.

12.3.2.4. Methodology

The Socio-economic Indicators Monitoring Program (PMISE) covers the municipalities of Camapuã, Costa Rica, and Figueirão. Additionally, the PMISE includes the collection of socio-economic indicators from the state of Mato Grosso do Sul and from Brazil, aiming to compare possible variations in local indicators with those at the state and national levels.

For the development of this program, five actions are considered, as presented below and detailed in the following section:

- Collection of secondary data.
- Collection of primary data.
- Analysis and monitoring of results.
- Disclosure of results and consolidated reports.

A. Collection of secondary data

Secondary data will be collected from electronic platforms such as the IBGE Automatic Recovery System (SIDRA). This system allows access to information from various IBGE structural research sources, including the Demographic Census, the National Household Sample Survey (PNAD), the Household Budget Survey (POF), the National Health Survey (PNS), annual economic surveys, the Department of Informatics of the Unified Health System (Datasus), the National Institute for Educational Studies and Research (Inep), the Ministry of Labor and Employment, the Ministry of Development and Fight against Hunger, the State Department of Social Defense (SEDS), among others.

The topics for data analysis and collection are presented below (this list is non exhaustive). It is worth mentioning that according to the perception of the need or possibility of collecting additional data, new topics and content will be included, as well as they can be excluded. It is also considered that the subtopics can be changed, according to the unfeasibility of access to information:

- Total population
- Population by household status and urbanization level
- Population by gender
- Population by age range
- List of migrants

- Gross Domestic Product (GDP)
- Municipal financial situation
- Formal employment by industry
- Employment trends
- Average wage for formal employment
- Economic development
- Hotel infrastructure
- Basic staples food basket price survey
- Real estate market dynamics
- Economic aspect of rural properties
- Municipal school system
- Enrollment/Student numbers
- Teaching staff
- Literacy rate
- Education level of the adult population
- Dropout rate by educational stage
- Healthcare facility
- Number of hospital beds available
- Resource/coverage indicators
- Healthcare services
- Vital statistics
- Mortality rate
- Resident death
- Health programs and initiatives
- Percentage of social welfare beneficiaries
- List of social welfare programs
- Assistance and monitoring service for women victims of violence
- Care, treatment, and monitoring services for drug victims
- Care and monitoring services for people with sexually transmitted diseases
- Teenage pregnancy rates
- Housing situation
- Water supply and sanitation
- Electricity supply
- Garbage collection services
- Urban transportation
- Telephone and internet access

- Municipal public safety infrastructure
- Incidents of crimes against sexual dignity and personal integrity
- Reports of property crimes and violations
- Reports of drug trafficking and homicide cases
- Quality of life
- Availability and quantity of cultural and recreational facilities
- Tourism opportunities

It is worth noting that in this initial stage, the existing Environmental Control Plan/Record (RCA/PCA) information will be considered as the program's ground zero.

B. Collection of primary data

Primary data collection will be carried out through semi-structured and structured interviews/questionnaires, as well as Participatory Social and Environmental Diagnosis (PSD), considering the different target audiences. This activity will be performed in action 1 of this program.

For the target audience 'Public authorities (secretariats and other public offices), stakeholders, and representatives of the private sector', semi-structured individual interviews will be conducted initially, followed by face-to-face and/or virtual meetings in PSD format. In both situations, the proposed themes and socio-economic indicators should be addressed, as well as the participants' perceptions of the impacts of the enterprise on the locality.

It should be noted that face-to-face meetings should take place as a priority in locations considered relevant by the interviewees, especially representatives of public agencies. Additionally, in the case of PSD, it is recommended to organize groups of a maximum of six people, even if multiple meetings are necessary, to ensure proper implementation of the methodology.

Thus, structured interviews (questionnaires) will be conducted face-to-face in both groups, with a distinction of content directed to each of them. For properties neighboring the enterprise, the research instrument will cover a set of socio-economic questions, which address at least the proposed content in the collection of secondary data, and perceptions about the enterprise. For other areas within the ADI, only the interviewees' perceptions about the impacts of the enterprise will be addressed.

Nevertheless, to maintain a historical record and evolutionary understanding of the results of each theme, the panel research method will be used, considering the same participants in each campaign to be carried out annually. This approach allows for understanding the positive and/or negative changes that may occur in each territory, and their relationship with the enterprise and its actions. This action includes collecting the participant's signature on a consent form for continuous (annual) participation.

This action will take place **annually**, with the activities starting always three months prior to the presentation of the consolidated report

C. Analysis and monitoring of results

The results of the program may lead to mitigation, control, and/or compensatory actions. When identifying the need for actions, they must be directed to other the company’s socio-environmental programs with which they are related. This may result in the proposal of new programs, if necessary. For this reason, the Socio-economic Indicators Monitoring Program (PMISE) relates to all environmental programs, always keeping the focus on the community, and this should be clear in the program.

The matrix of monitored indicators will be updated **annually**, following the methodology oriented towards the collection of secondary and primary data, in addition to monitoring the historical evolution of the analyzed indicators. This will be presented through a consolidated report, with the dissemination and availability of the results in meetings with the community.

Also, concerning the analysis of results and monitoring, the PMISE should, through its results, assist in the articulation and implementation of effective actions aimed at improving municipal infrastructure (such as schools, hospitals, public safety facilities, leisure centers, and living spaces, among others), in alignment with other programs.

D. Disclosure of results and consolidated reports

For this program to achieve the expected effectiveness, it is important that the main results from the monitoring be disclosed to society and municipal public authorities through meetings that must take place annually, after consolidating the data obtained in the analysis of socio-economic indicators.

It is desirable that the following social actors participate in these discussions:

- Municipal Government – municipal secretariats, office members, government concessionaires, service providers, and the legislative power, represented by the Councilors.
- Productive Sectors – business entities, entrepreneurs, and farmers.
- Class Entities – representatives of unions, workers, and employers.
- Grassroots Movements – neighborhood associations, religious groups, and social movements.
- NGOs and Research Institutes – those working in the municipality or with an interest in the topics covered.

At this stage, meetings should be held to discuss the actions to be taken due to the results of the monitored socio-economic indicators. The meetings should be publicized through the Corporate Communication Plan.

The consolidated report should include detailed information on the methodologies used, photographic documentation of meetings and actions with the community, attendance lists from result-disclosure meetings, as well as the presentation of socio-economic indicators since official records began and considering the comparative chronology. This report should be presented **annually**, always after the presentation of the results.

12.3.2.5. Material and human resources

To implement the PMISE, a team comprising technicians from the social science field is considered, along with technology tools like laptops and cell phones.

12.3.2.6. Environmental indicators

Based on the established goals, the following are the environmental indicators of the PMISE that will contribute to monitoring the expected results of the program:

- ✓ Number of monitoring campaigns planned vs. implemented.
- ✓ Number of questionnaires applied in monitoring and profile of the interviewees.
- ✓ Sampling universe determined for the research and methodology applied for sampling.
- ✓ Research tools and instruments prepared and periodically reviewed.
- ✓ Updated database of socio-economic indicators.
- ✓ Number of feedback sessions held and profile of the public involved in the sessions.

12.3.2.7. Stages of the enterprise

As this program aims to assess the changes that the project will bring about in the municipalities, it will be implemented during the project's operational phase.

12.3.2.8. Implementation timeline

The schedule presented indicates the annual cycle of the program.

Table 12-20 - Schedule of the Socio-economic Indicators Monitoring Program

Annual actions	PERIOD											
	MONTHS											
	1	2	3	4	5	6	7	8	9	10	11	12
Collection of secondary data												
Collection of primary data												
Analysis and monitoring of results												
Disclosure of results												

Note: This schedule is not associated with specific months of the year.

12.3.2.9. Recording and tracking systems

Semiannual reports will be prepared, containing the results of the data collected and an analysis of any changes in the indicators.

12.3.2.10. Responsibility for the implementation

The research development team is envisioned to include professionals trained in the social science field, with established community relationships through other social programs or actions undertaken by the company.

13. PROGNOSIS

Project Alpha has been operating as a livestock enterprise since the mid-1980s. To evaluate the post-implementation scenario of the forestry activity, it is crucial to also assess the likely scenario if the forestry process were not implemented.

Thus, three scenarios are considered here:

- Non-implementation of forestry: maintenance of livestock activities.
- Non-implementation of forestry: decline[17] in livestock activities.
- Implementation of forestry.

Project Alpha currently has around 5,000 head of cattle, although the property previously operated with significantly more. Considering the maintenance of the livestock operation with a higher number than at present, some relevant aspects related to the Physical and Biotic Environments are considered, as described below.

It should be borne in mind that native vegetation is currently restricted to the Legal Reserve and the Permanent Preservation Areas (APPs) of watercourses. In a scenario where the cattle ranching operation is maintained, the vegetation in the Legal Reserve would be more likely to be preserved than that in the APPs. This is because the Legal Reserve is a solid fragment with less interference from edge effects. The APPs, on the other hand, could be invaded by exotic grasses (*Brachiaria* spp.) and possibly by cattle for desedentation.

With regard to the soil, the constant trampling of cattle leads to greater soil compaction, which directly interferes with the infiltration of rainwater, consequently affecting groundwater recharge.

Considering the decline of livestock farming, the area would no longer undergo regular maintenance. Thus, uncontrolled grass growth would be expected, since there would be no staff in the area for maintenance and no herd for grazing. In addition, unmanaged pasture areas are significantly more prone to fires. With regard to the risk of fire, we highlight the risks related to the loss of flora and fauna species, the likelihood of an impact on livestock activity, as well as the risk to surrounding properties.

[17] The scenario of the decline of livestock farming was taken into account, as it was determined in the field that the current owners of the farm where Project Alpha is located were no longer interested in continuing this business.

In terms of socio-economics, maintaining livestock farming means retaining jobs with the possibility of increasing production and, consequently, the number of workers, given the farm's capacity to accommodate more cattle. The preservation of tax revenue related to livestock farming is also taken into account. Considering the decline in activity, there is a decrease in jobs, resulting in a reduction in the purchasing power of farm employees. Additionally, it must be considered that 17,151 hectares (71%) would become unproductive land, leading to a decline in tax revenue.

When considering the scenario of implementing forestry activity, one must consider not only the economic activity itself and the impacts associated with it, but also the entire framework of procedures, guidelines, actions, and socio-environmental programs that the company carries out.

From the perspective of the Physical and Biotic environments, we should first highlight the alteration of the landscape caused by the change in Project Alpha's business. Generally, the establishment of eucalyptus plantations will expose the soil and make it more prone to erosion. However, as proposed in the Erosion Control and Monitoring Program and related procedures (see item 12.1.2), this is an impact with a proposed mitigation measure. Regarding natural areas, it should be noted that there are still Permanent Preservation Areas (APPs) at Project Alpha that have not been fully constituted. It should be noted here that these areas would be difficult to recover if cattle ranching continued. However, the company has an ongoing Degraded Area Recovery Plan (PRADA) that focuses on these areas.

A relevant aspect that spans the Physical, Biotic, and Socio-economic domains concerns the quality and availability of water. It is well-known that monoculture plantations, including eucalyptus plantations, require a significant amount of water, especially in the initial years of tree establishment. Consequently, a potential outcome could be a decrease in water availability in the region. This will be monitored through the specific program outlined in item 12.1.1. Regarding the possible alteration of water parameters (water quality), in addition to the aforementioned program, the company has robust procedures in place to mitigate this impact. It is noteworthy that the company will ensure the protection of Permanent Preservation Areas (APPs) with a buffer larger than that required by Brazilian legislation; this will enhance the protection of existing watercourses and reduce the likelihood of water scarcity.

Regarding the biotic environment, there is an environmental benefit from converting pasture areas into reforested areas of native vegetation. Additionally, despite eucalyptus being an exotic monoculture, it still provides better ecological resources than pasture areas. There is also the potential to establish a wildlife corridor with the acquisition of new areas. This corridor could serve a significant ecological function, considering the pasture matrix prevalent in the region.

Still concerning the biotic environment, the implementation of procedures, the management of invasive grasses, fire control measures, and the proposed environmental programs will guarantee the preservation of native green areas. Particularly noteworthy is the Fauna as an Indicator of Environmental Quality Monitoring Program, a proposal aimed at enhancing scientific understanding of the region. Additionally, the Environmental Education Program includes specific actions that can positively impact the biotic environment, such as addressing human-caused fires and hunting, both common activities in the region.

Regarding the Socio-economic Environment, local development is considered through the employment opportunities provided to external workers and the stimulation of the economy. Another social benefit is the initiation of actions undertaken by the company with local communities.

In general, it is possible to verify that the forestry activity to be developed by the company complies with all the IFC's Performance Standards (listed below). The entire process, from property acquisition and phaseout of the current activity to the implementation of forestry, operation of the enterprise, procedures, work instructions, operational guidelines, and environmental programs, ensures compliance with the Performance Standards.

Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
Performance Standard 2: Labor and Working Conditions
Performance Standard 3: Resource Efficiency and Pollution Prevention
Performance Standard 4: Community Health, Safety, and Security
Performance Standard 5: Land Acquisition and Involuntary Resettlement
Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
Performance Standard 7: Indigenous Peoples
Performance Standard 8: Cultural Heritage

14. ASSESSMENT OF STAKEHOLDER ENGAGEMENT AND INFORMATION DISSEMINATION

The establishment of a communication channel between the project and its stakeholders enables the identification and constant evaluation of critical points related to the participation and engagement of stakeholders in the actions and activities related to planning, implementation, and operation of projects. In this context, the development and implementation of a Stakeholder Engagement Plan (SEP) are recognized as fundamental tools. The purpose is to facilitate the adoption of measures that align with the diverse interests inherent in the social relationships established within the territories affected by a new value chain and business associated with a project.

The mapping, identification, and classification of stakeholders involved with the activities of Project Alpha and the preparation and implementation of an Engagement Plan, presented in this document, align with the socio-environmental guidelines of conventions, national and international resolutions, and declarations. These guidelines guide good practices to be observed during the implementation and operation of projects.

The delimited area of influence corresponds to the same one presented in Chapter 6. Each territory presents different realities that require adjustments and agreements to establish safe and stable communication processes between the project, populations, and social organizations. According to IFC (2012, p. 29), ‘stakeholder engagement is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts.' The responsibility lies with the project to 'identify the range of stakeholders that may be interested in their actions and consider how external communications might facilitate a dialog with all stakeholders' (IFC, 2012, p. 30).

The aim of this Stakeholder Engagement Plan is to outline stakeholder relationship strategies and propose structural actions to improve the company's relationship with external and internal stakeholders, taking into account the gains related to engagement. In this way, ten groups were mapped:

- Populations within the administrative limits of Camapuã, Costa Rica and Figueirão
- Public authorities ADI - Camapuã, Costa Rica and Figueirão headquarters
- Associations/representative entities and community leaders
- Media and means of communication
- Directly affected neighboring residents of Project Alpha

- Civil society - Santa Barbara Community
- Santa Tereza Quilombola Community
- Migrants
- Internal workers
- Livestock workers

Following the identification of the parties involved, a classification will be conducted for the aforementioned groups based on the Nature of Impact, Magnitude, and Degree of Influence, using a scale of Low, Medium, and High. Subsequently, the outcomes of this assessment will form the foundation for the Positioning Analysis, and ultimately, the Sensitivity Analysis will summarize the attributes examined. This process facilitates the prioritization of stakeholders, determining those requiring precedence and guiding the selection of suitable engagement strategies for the entrepreneur.

Table 14-1– Stakeholder Classification

Groups	Degree of influence*	Potential impacts	Incidence of impact	Nature of Impact	Magnitude of impact
Populations within the administrative limits of Camapuã, Costa Rica and Figueirão – All	Low	Boosting local economies	Indirect	Positive	Low
Public authority ADI – Camapuã, Costa Rica and Figueirão headquarters	High	Changes in local infrastructure and public services	Indirect	Negative	High
		Change in tax collection	Indirect	To be verified/Under analysis	To be verified/Under analysis
		Boosting local economies	Indirect	Positive	Low
		Changes in pressure exerted on roads	Direct	Negative	Low
Associations/Representative entities and community leaders	High	Generation of expectations	Indirect	Negative	High
Media and means of communication	High	Boosting the local economy	Indirect	Positive	Low
Directly affected neighboring residents of Project Alpha	Average	Generation of expectations	Indirect	Negative	High
		Changes in pressure exerted on roads	Direct	Negative	Low

Groups	Degree of influence*	Potential impacts	Incidence of impact	Nature of Impact	Magnitude of impact
		Changes in water availability for properties around Project Alpha	Indirect	Negative	High
Civil Society - Santa Barbara Community	Average	Changes in pressure exerted on roads	Direct	Negative	Low
		Generation of expectations	Indirect	Negative	High
Santa Tereza Quilombola Community	Average	Generation of expectations	Indirect	Negative	High
		Changes in pressure exerted on roads	Direct	Negative	Low
Migrants	Low	Generation of expectations	Indirect	Negative	High
Internal workers	Low	Potential cultural conflicts	Indirect	Negative	Average
Livestock workers	Low	Generation of expectations	Indirect	Negative	High
		Dismissal of workforce	Direct	Negative	Average

Source: Tetra Tech (2023).

The main demands and needs expressed by stakeholders regarding the region's weaknesses were mapped, along with concerns about the potential impacts on current life dynamics caused by the project. The identified needs and recommendations for actions to be taken by TTG Brasil, aimed at mitigating them, are outlined in the Engagement Plan prepared by Tetra Tech (2023).

In broad terms, the Engagement Plan was formulated and is expected to be implemented considering the cyclical nature of the engagement process, which includes four milestones: (i) Planning, (ii) Preparation, (iii) Implementation, and (iv) Reviewing and Updating the Stakeholder Engagement Action Plan.

Figure 14-1- Milestones of the Engagement Plan.



Source: AccountAbility (2015). Own elaboration

In this regard, it should be reviewed, updated, and its implementation continued, taking into account the corporation's ongoing dialogue with stakeholders. This auxiliary tool should serve as the foundation for this update, forming an integral part of this delivery.

By cross-referencing the characteristics of the groups and their classification, we establish a prioritization of stakeholders, followed by the creation of a Detailed Action Plan. This plan considers their characteristics, level of engagement, engagement methods, and recommended actions. The Engagement Plan, developed by Tetra Tech (2023), also outlines all review, monitoring, and reporting procedures.

15. CONCLUSION

The aim of this study was to analyze the transition from livestock farming to forestry at Project Alpha. For this document, we considered:

- The process for this transition (Chapter 4).
- Applicable legislation - state, national, and relevant international precepts (Chapter 3).
- The areas of influence of the activity (Chapter 6).
- The region's current outlook for the Physical, Biotic, and Socio-economic environments (Chapter 7).
- The expected environmental aspects and impacts (Chapter 8).
- Health and safety standards and risks associated with forestry (Chapter 9).
- The risks associated with forestry activity (Chapter 10).

In line with this analysis, it was important to consider:

- Control procedures carried out by the company (Chapter 11).
- Proposed environmental and social programs (Chapter 12).
- Stakeholders involved in the region (14).

It is worth noting that the company conducts its operations with the aim of minimizing and mitigating possible impacts, as outlined in the company's FSC Forest Management Plan. It is important to emphasize that the company already has a set of procedures and guidelines in place to mitigate potential impacts and ensure the safety of forestry activities. This includes aspects such as the protection of workers, including those in the supply chain, the preservation of soil, water resources, flora, fauna, and the communities involved.

In addition, considering the specific context of Project Alpha, this document proposes socio-environmental programs aimed at mitigating possible negative impacts, monitoring the transition of the landscape, and fostering positive interaction with the communities located in the municipalities adjacent to the farm.

Therefore, the studies presented confirm that the project devised for Project Alpha fully complies with the legal guidelines and socio-environmental restrictions, from an environmental, locational, and technological standpoint, in the region where it is located.

Finally, concerning the classification of this project, when a project is proposed for financing, Financial Institutions (FIs) will categorize the project based on the magnitude of potential environmental and social risks and impacts as part of their internal environmental and social review and due diligence. Such categorization follows the International Finance Corporation's environmental and social categorization process[18]. The categories are:

- Category A – Projects with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented.
- Category B – Projects with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.
- Category C – Projects with minimal or no adverse environmental or social risks and/or impacts.
- Category FI – Projects involving investments in FIs or through delivery mechanisms involving financial intermediation. This category is subdivided into:
    - FI-1: where the existing or proposed portfolio of a FI includes, or is expected to include, substantial financial exposure to activities with potentially significant adverse environmental or social risks or impacts that are diverse, irreversible or unprecedented.
    - IF-2: when the existing or proposed portfolio of an FI is composed, or is expected to be composed, of activities that present potentially limited adverse environmental or social risks or impacts that are few in number, generally site-specific, largely reversible and easy to correct through mitigation measures; or that include a very limited number of activities with potentially significant adverse environmental or social risks or impacts that are diverse, irreversible or unprecedented.
    - FI-3: where an FI's existing or proposed portfolio includes financial exposure to activities that have predominantly minimal or no adverse environmental or social impacts.

In the case of FI investments, when IFC resources are traceable and earmarked for a specific end use, IFC will determine the social and environmental category based on the risks associated with the specific end use. When IFC resources provide general financial support to a FI (such as capital in a bank), the FI's entire portfolio will be taken into account in determining the category.

Thus, the project in focus can be categorized as 'B' due to the fact that its impacts, as presented above, are mitigable, reversible and site-specific.

[18] IFC Environmental and Social Performance Guidelines, link: https://www.ifc.org/en/what-we-do/sectorexpertise/sustainability/policies-and-standards

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Annex A

Project Alpha Stakeholder Engagement Plan



Project Alpha Stakeholder Engagement Plan

Camapuã, Costa Rica and Figueirão – Mato Grosso do Sul

TTG Brasil

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Project Alpha Stakeholder Engagement Plan

Camapuã, Costa Rica and Figueirão – Mato Grosso do Sul

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1. INTRODUCTION

Establishing a direct communication channel between the project and its stakeholders enables the identification and continual evaluation of crucial aspects related to stakeholder engagement and participation in the planning, execution, and operation of projects. Within this framework, the development and implementation of a Stakeholder Engagement Plan (SEP) are recognized as fundamental tools. The aim is to facilitate the adoption of measures that align with the diverse interests inherent in the social relationships established within the territories affected by a new value chain and businesses associated with a project.

International financing bodies like the Inter-American Development Bank (IDB), World Bank (WB), International Finance Corporation (IFC), European Bank for Reconstruction and Development (EBRD), Asian Infrastructure Investment Bank (AIIB), European Investment Bank (EIB), and other funding agencies mandate the adoption of recommendations and guidelines concerning stakeholder relationships. Additionally, pivotal regulations at a national level, such as ILO 169, Ordinance No. 60/2015, and Decree No. 6,040/2007, outline crucial social participation guidelines pertinent to the relationship between private entities and local communities.

Consequently, the identification, mapping, and classification of stakeholders involved with **Project Alpha**'s activities, along with the formulation and execution of an Engagement Plan presented in this document, align with the socio-environmental guidelines outlined in conventions, national and international resolutions, and declarations. These guidelines prescribe best practices during project implementation and operation.

It is crucial to emphasize that, within this Engagement Plan, stakeholders are defined as individuals, groups, or organizations capable of influencing and/or being impacted — positively or negatively — by the activities, products, or services associated with Project Alpha's forestry activity (ACCOUNTABILITY, 2015).

Adhering to these guidelines, Tetra Tech América do Sul has elaborated the Stakeholder Engagement Plan for Project Alpha, structured around three key stages as the fundamental methodological approach: i) stakeholder identification; ii) stakeholder classification; and iii) definition of engagement levels and methods.

2. BRIEF DESCRIPTION OF THE PROJECT AND AREA OF INFLUENCE

Project Alpha spans across 24,119 hectares, situated in the north/northeast region of the state of Mato Grosso do Sul, encompassing the municipalities of Figueirão, Costa Rica, and Camapuã.

Prior to the mid-1980s, Project Alpha boasted a significant expanse of native forest, with nearly all its land preserved. However, in the late 1980s and early 1990s, the native vegetation was gradually replaced by pasture areas. Since 1992, the use and occupation of the land at Project Alpha have hardly changed, maintaining a pasture matrix and preserving a portion as Legal Reserve.

The Project Alpha aims to convert pasture areas (currently 17,071 hectares) into forest recovery areas (2,599 hectares) and forestry activity areas (14,621 hectares). This conversion will occur over approximately three years in planting plots. The restored native forest areas will be maintained, while the eucalyptus plantation areas will undergo cycles of planting, growth, harvesting, sale, and replanting.

Project Alpha is owned by Camapuã Agropecuária LTDA, a company under the ownership of The Reforestation Fund (TRF). Project Alpha's operational activities are conducted by TTG Brasil Investimentos Florestais Ltda. ("TTG Brasil"), a subsidiary of the BTG Pactual Timberland Investment Group ("TIG").

The project has the following areas of influence[1]:

The Directly Affected Area is Project Alpha; however, for this engagement plan, we have considered the Area of Direct Influence and Area of Indirect Influence, as described below.

(i) Directly Affected Area (DAA)

The Directly Affected Area encompasses the entire 24,119-hectare expanse within the boundaries of Project Alpha. Within this area, the area of interest is the portion of land designated for reforestation and forestry activities, totaling 17,071 hectares. Within this allocation, 2,450 hectares (10%) are intended for forest recovery, while 14,621 hectares (61%) are allocated for forestry purposes. Upon the completion of the forest recovery, Project Alpha will encompass a native forest area of 8,994 hectares, accounting for 37% of the total.

[1] The Areas of Influence considered in this plan correspond to those presented in the project's Socio-Environmental Impact Study (ESIA), prepared by Tetra Tech in September 2023.

(ii) Area of Direct Influence (ADI)

Covering the entire area directly affected by the implementation and operation of Project Alpha's activities, this assessment encompasses residents and surface workers situated within a 1 km buffer zone around the farm. This zone includes the urban headquarters of Camapuã, Costa Rica, and Figueirão municipalities. Additionally, the assessment expands to cover the highways linking these urban centers to Project Alpha, with a 50-meter buffer on each side, as depicted in **Figure 2-1**.

The demarcation of this area of influence is justified by its proximity to Project Alpha, the critical local roads connecting neighboring municipalities, and the water resources from springs within Project Alpha and its surrounding area. Despite the physical distance between the farm and the urban centers of Camapuã, Costa Rica, and Figueirão, they are considered Areas of Direct Influence (ADI).

This classification is due to the significant impact Project Alpha has on these centers, resulting in potential positive and negative effects. These effects include the employment of project-hired individuals residing in the municipalities, alterations in local economic activities, tax implications, and the utilization of local labor. Furthermore, the disruption experienced by the population along the communication routes between the farm and municipal headquarters contributes to considering these urban centers as ADI.

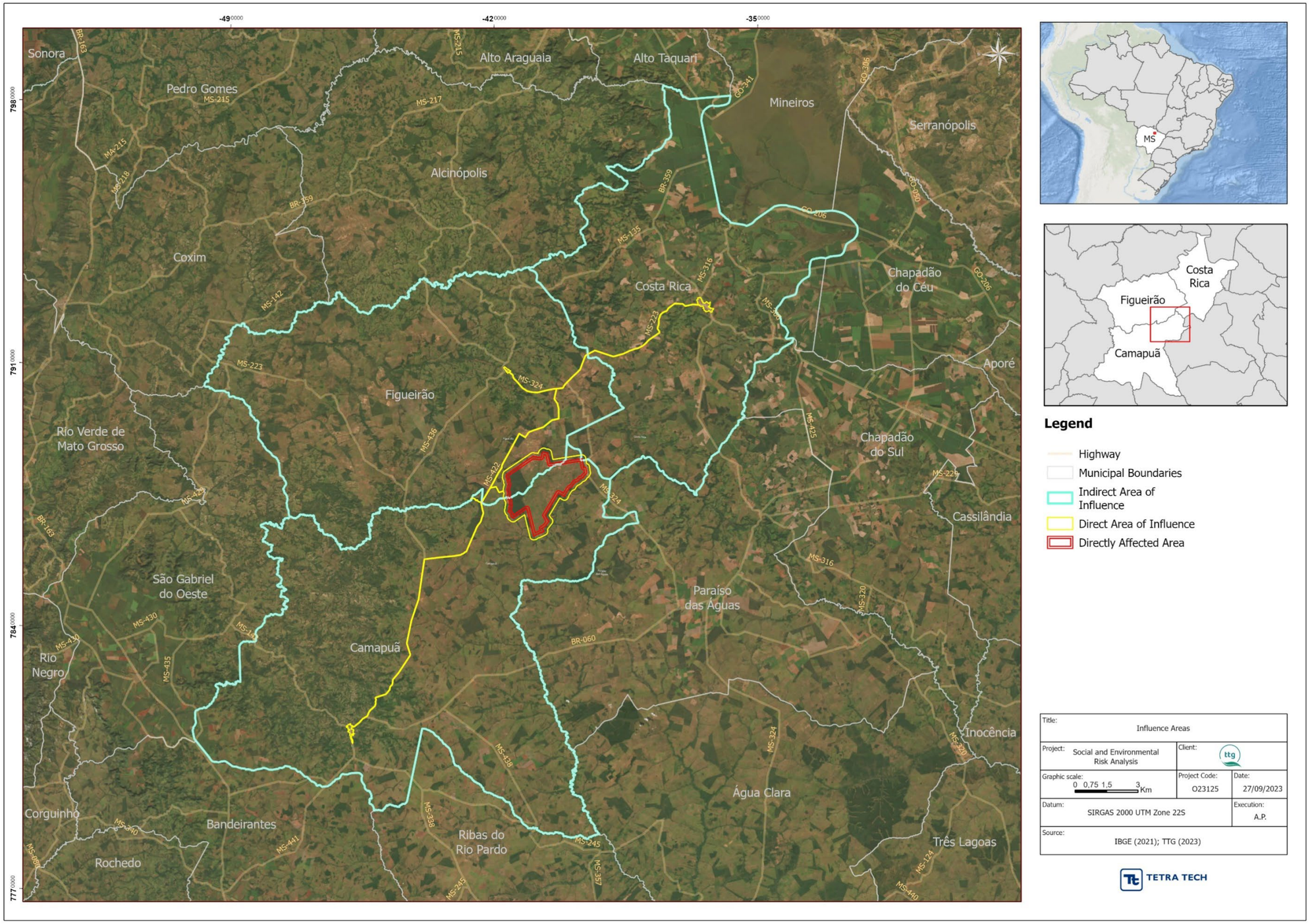
In the case of Figueirão, established in 2005 and with a population of around 3,500 residents, half of whom reside in rural areas (IBGE, 2022), the influx of new employees is anticipated to alter the dynamics of the municipality. This transformation could manifest across diverse facets, including housing, healthcare, commerce, education, and various other municipal services.

Additionally, the MS-442 section and the local roads connecting Project Alpha to the municipal headquarters are designated as ADI. This designation is justified due to the anticipated increase in vehicle traffic along this road segment, influenced by the daily transportation of workers and the movement of trucks and other vehicles associated with Project Alpha's activities.

(iii) Area of Indirect Influence (AII)

Recognizing Project Alpha's presence across three municipalities, albeit in differing extents, it is clear that each will experience direct or indirect, favorable or adverse effects from the project. As a result, the Area of Indirect Influence (AII) encompasses the administrative boundaries of these three municipalities: Camapuã, Costa Rica, and Figueirão, depicted in **Figure 2-1**.

Figure 2-1 - Area of Influence - DAA, ADI and AII



Source: Tetra Tech (2023).
Image from Google Earth (2023).

3. THE ENGAGEMENT PLAN AND ITS MAIN OBJECTIVES

By establishing new complex and widely diversified value chains, a given project may involve numerous stakeholders in the territories where it operates. Each of these stakeholders possesses distinct organizational and behavioral characteristics that mirror various concerns. Identifying this array of actors and demands becomes crucial. This process enables the construction of a repertoire of strategies to be incorporated into an Engagement Plan tailored to the diverse relationships between Project Alpha and the various interests of local stakeholders.

Guided by the good practice guidelines and legal determinations previously mentioned, the process of mapping, classification, and subsequently adopting relationship strategies aimed at engaging stakeholders with the project must be based, from the outset, on principles of transparency, inclusion, participation, and the ability to generate satisfactory responses to any doubts and complaints that may be raised to Project Alpha.

It is noteworthy that the mapping, classification of the degree of impact and influence on affected stakeholders, and the development of the Project Alpha Engagement Plan were conducted with primary reference to methodological procedures and guidelines outlined in AccountAbility's AA1000 Stakeholder Engagement Standard (2015), the Global Reporting Initiative (GRI), the International Finance Corporation (IFC), and the Inter-American Development Bank's publication named 'Meaningful Stakeholder Consultation: IDB Series on Environmental Risks and Opportunities and Social' (IDB, 2017).

These conceptual references offer guidance for creating the stakeholders matrix, serving as the primary tool for qualitatively analyzing the positions and levels of engagement proposed in the relationship between stakeholders and TTG. The outcomes depicted in the stakeholder matrix reflect situational and momentary analyses of stakeholders' positioning orientations, which might evolve as new information or circumstances influence their connection with the project. Additionally, potential external factors could modify local conditions influencing these positions, which may not necessarily result from inadequacies in the execution of this Engagement Plan.

Each territory presents different realities that require adjustments and agreements to establish safe and stable communication processes between the project, populations, and social organizations. According to IFC (2012, p. 29), ‘stakeholder engagement is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts.' The responsibility lies with the project to 'identify the range of stakeholders that may be interested in their actions and consider how external communications might facilitate a dialog with all stakeholders' (IFC, 2012, p. 30).

According to the Global Reporting Initiative (GRI) (2016, p. 8), ‘Establishing a timely and effective stakeholder identification and engagement process is important to help organizations understand the vulnerability of local communities and how these might be affected by the organization’s activities’.

Considering the land use changes and their resulting impacts, understanding the affected parties and establishing stronger connections with them becomes paramount. The main objective of this study is to formulate strategic methodologies for engaging stakeholders and integrating structural measures to strengthen the relationship between the project and both its external and internal audiences. This involves recognizing the advantages linked to effective engagement.

4. STAKEHOLDERS IDENTIFIED

In the formulation of this Engagement Plan, the stakeholder mapping aims to assess and systematize the level of significance of all 'individuals, groups, or institutions that have a stake, or an interest, in the project: They may be affected by it (either positively or negatively), or they may have an interest in it and be in a position to influence its outcomes' (IDB, pg. 7).

The stakeholder mapping commenced by initially examining secondary data retrieved from prior documents and studies, such as the Social Advancement study conducted by Simbiose Socioambiental. Additionally, information was gathered from various sources, including institutional websites of government agencies, public authorities, and websites of civil society organizations operating in the respective localities.

Subsequently, between the 21st and 25th of September 2023, fieldwork was conducted in the territory to review and complement the earlier stakeholder mapping. The identification criteria adopted considered geographic factors and individuals or groups not originally identified in the secondary dataset, particularly those who hold significance or influence within the localities.

4.1. STAKEHOLDER MAPPING

Based on the abovementioned guidelines and contextualizing the project within local development contexts, this Engagement Plan identifies the social groups with potential involvement in the project, along with their identified vulnerabilities, namely:

4.1.1. Populations within the administrative limits of Camapuã, Costa Rica and Figueirão – All

Stakeholders indirectly affected by the project include those within the expansive Project Alpha area, spanning three municipalities. This expansion results in increased vehicular and human traffic, driven by heightened movement of goods. Consequently, it contributes to the municipalities' revenue and promotes economic development by boosting the flow of people and capital within their respective regions. This group considers each municipality's administrative boundaries and its wider implications, along with the demarcation of areas directly impacted by the project.

4.1.2. Public authority ADI – Camapuã, Costa Rica and Figueirão

The activation of new business chains through Project Alpha's operations holds the potential to expand municipal tax collection while simultaneously exerting pressure on the social infrastructure of the three municipalities. As a result, both positive and negative changes in local governance structures could arise due to these dynamics.

Camapuã, Costa Rica and Figueirão, with populations of 13,583, 26,037, and 3,539 inhabitants, respectively, according to IBGE (2022), are small municipalities that not only encompass a portion of Project Alpha's territory but also lodge its workforce and provide local labor, when necessary.

Figueirão hosts the largest number of third-party contractors from the project, totaling about 60 workers. Additionally, independent individuals migrate to the region, seeking job opportunities. Given the municipality's size, this influx significantly impacts local dynamics, straining limited infrastructure. According to the deputy mayor and the social assistance secretary, apart from the surge in real estate rental prices and the scarcity of available housing, migrant families arrive in an extremely vulnerable condition, relying on donations and social projects facilitated by the city hall.

According to interviewed members, the demand for schools, healthcare, and social assistance services has grown exponentially in recent months. Another identified issue is the lack of specialized local labor, which became more evident following the absorption of some local workers by new projects unrelated to Project Alpha.

With regard to the potential migration of workers to the three municipalities, it was observed that there are other enterprises in the region, such as the new Suzano plant. Thus, impacts in the territory may overlap, whereby the migration of workers is not necessarily related to the implementation of forestry activities at Project Alpha. In this context, socio-environmental programs (Program for Monitoring Socioeconomic Indicators) are being implemented, allowing a more accurate assessment of the potential impacts of Project Alpha both in the municipality of Figueirão and in the others.

Finally, alongside the positive impacts stemming from the project's contribution to the development of the local economy, negative impacts were identified due to the lack of communication and planning between the project and city halls.

This group comprises entities vested with the authority to exercise legally established power across legislative, executive, and judicial spheres. City halls, secretariats, various public structures, and other entities may, during the project's development, require restructuring and the enhancement of capabilities to adapt to the new realities brought about by the project

Identified risks: Overload of social assistance needs, healthcare, and education services; lack of adequate infrastructure to accommodate a significant number of people; real estate pressure; shortage of qualified local labor; and the generation of expectations.

4.1.3. Associations/Representative entities and community leaders

Civil society organizations, alongside community leaders, play a crucial role in local political dynamics, serving as essential instruments for channeling demands and mobilizing the community. These leaders and organizations not only possess the ability to articulate demands but also amplify local political, environmental, and social agendas, broadening the reach and significance of sensitive demands within the region.

Associations and community leaders were identified within the vicinity of Project Alpha, particularly in the Santa Barbara and Santa Tereza Quilombola communities. Additionally, residents mentioned leaders, such as councilors or potential councilor candidates in Figueirão.

This group comprises local community associations, non-governmental organizations, local leaders, and other organized collective institutions. Their activities within the localities are associated with addressing social issues concerning health and education.

Identified risks: Increased pressure on the demand for school and healthcare services to meet the community's needs.

4.1.4. Media and means of communication

Communication serves as the primary tool for cultivating a positive relationship between project managers and the community. Effective dialogue promotes and disseminates information about the project, thereby amplifying positive impacts and mitigating adverse effects within the region.

Consequently, establishing the Media and Means of Communication group is crucial in order to identify deficiencies in social communication with stakeholders within the territory. The stakeholder research process identified key channels for information dissemination in the region, notably social media platforms like Instagram, Facebook, WhatsApp, and local radio networks.

Identified risks: Lack of information and ineffective communication with the communities affected by the project.

4.1.5. Directly affected neighboring residents of Project Alpha

The families residing around Project Alpha constitute one of the groups most significantly affected by the project due to inadequate communication, utilization of water resources, and the increase in both population and traffic of vehicles in the area. These factors directly influence the perception of safety, mobility, and the condition of roads within the region.

The individuals included in this group are the neighboring residents living on the outer boundaries of the Farm. Among those interviewed, there was a notable concern regarding water resources, particularly the springs that supply most families, and the potential restriction of access to roads passing through Project Alpha. Additionally, concerns were raised about fires in eucalyptus areas, lightning, and alterations to the landscape. The interviewees expressed numerous uncertainties about the project and emphasized the need for closer communication with the company.

Residents mention that communication is facilitated by an outsourced consultant. However, despite this channel, the abovementioned questions remain unanswered, fostering an expectation for clearer communication regarding the potential impacts outlined earlier.

Furthermore, there is fluid communication between the residents and the property security group via WhatsApp, serving as a means to disseminate information about sporadic events such as fires in the region.

Identified risks: Lack of information and ineffective communication with affected communities; alterations in the landscape; heightened sense of insecurity.

4.1.6. Civil Society – Santa Barbara Community

The Santa Barbara Community, the project's closest community and area of influence, falls within the municipality of Camapuã. Leaders and residents from this area were interviewed and collectively expressed their primary concern about the project: the potential influx of workers who might circulate or live nearby. This influx is feared to potentially lead to disorderliness, heightened violence, and increased alcohol and drug consumption.

Residents highlighted the lack of investment in the local school and health center. Community leaders and residents are advocating for enhancements in the services provided and the development of proper infrastructure. Anticipating an influx of workers from other areas, they foresee an increased demand for essential services, which, in turn, will necessitate greater investments in the region from the city hall.

There are social projects carried out at the community school by TTG, which will be further detailed in the item 5.1.

Social projects conducted at the community's school by TTG will be elaborated on in section 5.1.

Identified risks: Creation of pessimistic expectations; shortcomings in basic services like healthcare; increased pressure on educational services; and security concerns.

4.1.7. Santa Tereza Quilombola Community

The Santa Tereza Quilombola Community, accredited by the Palmares Foundation in 2005, hosts two active associations in the region. Situated approximately nine kilometers from Project Alpha, the primary concern identified about the project revolves around the potential for disorder, violence, and drug use due to the arrival of workers who might circulate and/or reside nearby.

The primary challenge confronting the community currently revolves around income generation and acquiring resources to sustain the Santa Tereza Association of Residents and Quilombolas. To address these challenges, TTG conducts the Cerrado Seeds Project within the community, as detailed in item 5.1.

The primary economic activity in the region is dairy farming, wherein the association facilitates the sale of milk between producers and interested companies. One of the association's objectives, as mentioned by its representative, is to establish a processing facility for the milk sold, aiming to produce cheese and sweets, thus creating job opportunities and increasing income circulation. Additionally, there are activities related to land use, including fishing, gathering firewood, and cultivating bananas, corn, and cassava for subsistence purposes.

Identified risks: Employment and income shortages; creation of pessimistic expectations; challenges in transferring knowledge to new generations; security concerns.

4.1.8. Migrants

Some families migrate to the municipality of Figueirão in pursuit of improved living conditions. They are driven by informal communications regarding new developments in the region.

A field observation revealed that there are other ventures in the region with a greater potential for job generation compared to Project Alpha. Therefore, there is a notable possibility of overlapping impacts in the territory, requiring periodic assessments to monitor these potential impacts. In this context, socio-environmental programs (Program for Monitoring Socioeconomic Indicators) are being implemented, allowing for a more accurate assessment of the potential impacts of Project Alpha both in the municipality of Figueirão and in the others.

Even without formal employment opportunities, families, each comprising approximately two or three children, arrive in the territory under highly vulnerable conditions, hoping to secure work in the region, as per the City Hall's report. Municipal departments report that migrant families require social assistance services, including donated milk, blankets, food parcels, maternity packs, and others. The municipality also acknowledges strain on schools and health services due to a substantial surge in enrolment and healthcare demand.

Identified risks: Creation of expectations for improved living conditions; reliance on donations from social projects; lack of specialization; lack of opportunities; unemployment; quality of life; financial conditions; and poverty.

4.1.9. Internal workers

Considering that the majority of workers hired by the project's outsourced companies originated from other regions of the country, particularly Bahia and Maranhão, it is natural for them to experience cultural differences. Food emerged as a common topic among interviewed workers, with many expressing a noticeable contrast in seasoning and the type of food provided.

The absence of recreational opportunities for workers residing in the municipality of Figueirão has been identified. They have expressed a shortage of activity choices available to them during their days off.

Identified risks: Cultural differences in dietary preferences; absence of recreational activities.

4.1.10. Livestock workers

Project Alpha previously provided exclusive services related to livestock farming, encompassing breeding, reproduction, and cattle commercialization. However, with the introduction of the new project, forestry is displacing or will displace livestock farming. The gradual cessation of this activity, scheduled to conclude by November 2023, is underway, leading to the gradual departure of the cattle from the farm.

Currently, five employees are dedicated to this activity, all of whom are formally hired. Four of them were interviewed and demonstrated awareness and understanding of the situation at the farm and the imminent conclusion of the livestock operations. One of the workers resides at Project Alpha with his family, while the others stay during the week and return home on Saturdays.

They believe that the project will bring development to the region by enhancing roads, healthcare facilities, and services. However, they emphasize that they would be more content if livestock farming were to continue. They expressed concerns about the profile of the newly arrived workers, noting that the majority of them are single men. According to their perspective, this influx could potentially contribute to increased insecurity and violence in the region

It's worth noting that the four interviewed workers have a long-standing connection to the territory and the work conducted there. Two of them have been at the farm for over 20 years, one for 39 years, and the other for six. The conclusion of livestock farming also means a significant change in the lives of these workers, who will now need to seek employment on other farms or adapt to new activities. They emphasized that the impacts of terminating the activity have already been noticeable since they became aware of the intention to sell Project Alpha, leading to a lack of investment and, consequently, an overload of services.

Identified risks: loss of housing, unemployment, and security concerns.

4.2. VULNERABLE GROUPS IDENTIFIED

According to the IFC Performance Standards, in cases where a project is anticipated to cause impacts, it is crucial to pinpoint ‘individuals and groups that may be directly and differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status. Where individuals or groups are identified as disadvantaged or vulnerable, the client will propose and implement differentiated measures so that adverse impacts do not fall disproportionately on them and they are not disadvantaged in sharing development benefits and opportunities.’ (IFC, 2012,

p. 8). Furthermore, it points out that ‘Where applicable, the Stakeholder Engagement Plan will include differentiated measures to allow the effective participation of those identified as disadvantaged or vulnerable’ (IFC, 2012, p. 30).

The IFC identifies that ‘this disadvantaged or vulnerable status may stem from an individual’s or group’s race, color, sex, language, religion, political or other opinion, national or social origin, property, birth, or other status. The client should also consider factors such as gender, age, ethnicity, culture, literacy, sickness, physical or mental disability, poverty or economic disadvantage, and dependence on unique natural resources.’ (IFC, 2012, p. 8). Therefore, among the mapped stakeholders, the following groups that are considered vulnerable stand out:

- **Public authority ADI – Headquarters of Camapuã, Costa Rica and Figueirão**

The influx of people from different regions is already causing economic and infrastructure impacts on the municipalities. Without effective planning and alignment of expectations, these areas might face greater difficulties.

- **Directly affected neighboring residents of Project Alpha**

The potential impact on spring waters, serving as a crucial supply source for numerous families, livestock, and irrigation, renders this group vulnerable to potential violations of human rights concerning both the quantity and quality of available water, which could pose health risks. Additionally, impacts associated with changes in land use may further jeopardize community safety, leading to increased vulnerability.

- **Santa Tereza Quilombola Community**

Indigenous peoples and traditional communities are deemed vulnerable groups due to their distinct ways of life, which diverge from the norms of post-colonial society. To conserve and safeguard these groups, Quilombola Communities are recognized as cultural heritage, leading to the implementation of specific actions aimed at preserving their culture.

- **Migrants**

The pursuit for better living conditions motivates families to migrate from other regions in search of job opportunities. The families that arrive in the municipality of Figueirão are deemed highly vulnerable, with a significant portion relying on donations for survival.

- **Livestock workers**

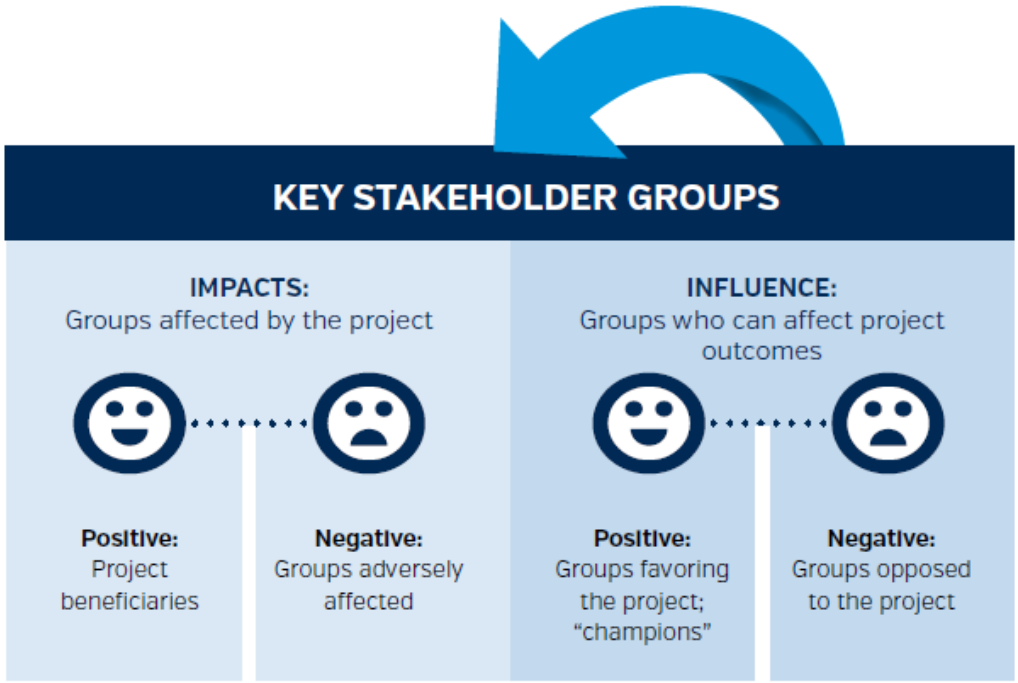
The termination of livestock activity at Project Alpha entails the dismissal or reassignment of workers to other tasks. Given their extensive experience in fieldwork, this group may encounter challenges adjusting to activities unrelated to livestock farming.

4.3. CLASSIFICATION

Lastly, following the identification of the parties involved, a classification will be conducted for the aforementioned groups based on the Nature of Impact, Magnitude, and Power of Influence, using a scale of Low, Medium, and High. Subsequently, the outcomes of this assessment will form the foundation for the Positioning Analysis, and ultimately, the Sensitivity Analysis will summarize the attributes examined. This process facilitates the prioritization of stakeholders, determining those requiring precedence and guiding the selection of suitable engagement strategies for the entrepreneur.

For IDB (2017, p. 7), the definition of levels and methods of engagement must occur after a detailed verification of the social groups that constitute the stakeholders and their degrees of impact and influence concerning the project. Consequently, these groups need to be classified according to the main categories presented below.

Figure 4-1 - Summary of the definition of stakeholders' degrees of impact and influence



Source: IDB (2017).

It is important to clarify that the stakeholder classification process is strictly qualitative. It is guided by: (a) prior research activities on the territory (social actors, conflicts, and characteristics), including subsequent site visits; (b) information provided by the client about the project; and (c) knowledge and past technical experience of analysts with similar projects. Therefore, given this context of subjectivity, it is crucial, as guided by the AA1000 Standard (ACCOUNTABILITY, 2015), as well as other related methodologies, that this classification also gets updated throughout the engagement process. Consequently, the flow of information concerning each involved actor is expanded.

The analysis of a project's risks and potential impacts plays a crucial role in facilitating dialogue between the technical team and stakeholders. It helps in assessing their impact levels, thus determining the significance of influence concerning the project. This requires a closer examination of the local reality and a more nuanced analysis of the stakeholders' perspectives, enabling the selection of engagement strategies aligned more closely with local realities.

The attribute **impact** aims to measure the level of change that the project's development may bring about in terms of social organization, the material reproduction of ways of life, and direct action by stakeholders. Based on the impact categories outlined by the IDB (2017, p. 17), the following are considered **impacts** in this Engagement Plan:

- Direct impacts: impacts potentially caused by the project and directly attributable to it, such as increased pressure on public services in ADI municipalities.

- Indirect impacts: impacts in which the project is one of several contributing factors and is not the original generator of the action.

Seeking to assess the project’s impact on each stakeholder, this methodology involves a qualitative analysis of the intensity of the identified impact, as outlined in **Table 4-1**.

Table 4-1 - Assessment of the impact

IMPACT		
Feature	**Description**	**Categories**
Incidence	The incidence of impact should indicate the level of interference that the project's actions may cause to stakeholders	**Direct**
		Indirect
Nature	The nature of the impact must indicate the type of interference caused by the project	**Positive**
		Negative
Magnitude	Analyzes the extent and intensity of the impact(s) on the stakeholder	**High**
		Medium
		Low

The analysis of stakeholders' ***degree of influence*** over the project and its decisions is a crucial step in developing an Engagement Plan tailored to each social group involved in the project. According to the IDB (2017, p. 29), it's essential to consider not only the stakeholders' interest in the project but also to comprehend their degree of influence based on their perspective regarding issues and actions related to the project's planning, installation, and operation. As per the Stakeholder Engagement Standard (2015), degree of influence can be exercised by groups or individuals capable of impacting the strategic and operational decision-making processes of the project.

Thus, this attribute sought to qualify the degree of influence of stakeholders through:

- Perspective: This refers to the stakeholder‘s standpoint regarding the project and the array of decisions involved in its implementation;
- Decision: This seeks to understand the stakeholder’s level of decision-making in the processes associated with the project’s implementation and operation;
- Articulation: This involves understanding the stakeholders or social groups’ ability to collaborate with other stakeholders to influence the project’s strategic decisions.

Below is the result of the stakeholder classification, considering the previously described items.

Table 4-2 - Stakeholder Classification

Groups	Degree of influence*	Potential impacts	Incidence of impact	Nature of Impact	Magnitude of impact
Populations within the administrative limits of Camapuã, Costa Rica and Figueirão – All	Low	Boosting local economies	Indirect	Positive	Low
Public authority ADI – Headquarters of Camapuã, Costa Rica and Figueirão	High	Changes in local infrastructure and public services	Indirect	Negative	High
		Change in tax collection	Indirect	To be verified/Under analysis	To be verified/Under analysis
		Boosting local economies	Indirect	Positive	Low
		Change in road pressure	Direct	Negative	Low
Associations/Representative entities and community leaders	High	Generation of expectations	Indirect	Negative	High
Media and means of communication	High	Boosting the local economy	Indirect	Positive	Low
Directly affected neighboring residents of Project Alpha	Medium	Generation of expectations	Indirect	Negative	High
		Change in road pressure	Direct	Negative	Low
		Perceived or actual change in water availability for surrounding properties	Indirect	Negative	High
Civil Society – Santa Barbara Community	Medium	Change in road pressure	Direct	Negative	Low
		Generation of expectations	Indirect	Negative	High

Groups	Degree of influence*	Potential impacts	Incidence of impact	Nature of Impact	Magnitude of impact
Santa Tereza Quilombola Community	Medium	Generation of expectations	Indirect	Negative	High
		Change in road pressure	Direct	Negative	Low
Migrants	Low	Generation of expectations	Indirect	Negative	High
Internal workers	Low	Potential cultural conflicts	Indirect	Negative	Medium
Livestock workers	Low	Generation of expectations	Indirect	Negative	High
		Termination of labor	Direct	Negative	Medium

Source: Tetra Tech (2023).

*Scale used to classify the stakeholders' degree of influence:

- **High**: The stakeholder is an opponent, supporter or can remain neutral in relation to the project and/or is considered highly influential or may have the ability to disrupt operations or shape the local reputation in relation to the project.
- **Medium**: The stakeholder is a defender, opponent, or neutral party in relation to the project. They are considered to have a medium level of influence, possessing the ability to impact the operations or reputation of the project.
- **Low**: The stakeholder is a defender, opponent, or may remain neutral in relation to the project. They are isolated and possess limited ability to exert influence on the project.

5. STAKEHOLDER ENGAGEMENT PROGRAM

5.1. STAKEHOLDER ENGAGEMENT DURING THE PROJECT'S PREPARATION

- **Preparation of the Social Progress Index (SPI)**

In the first half of 2023, the Social Progress Index (SPI) was created with the aim of characterizing, from a socioeconomic standpoint, the two rural communities neighboring the project and identifying the families' perception of the way of life in the area. The research was conducted using two forms: the Socioeconomic Diagnosis Form and the SPI Form, with interviews conducted among 39 families.

- **Actions at Lucas Alves do Vale School (Santa Barbara)**

Smile in the Field Project

TTG Brasil, the Regional Dentistry Council of Mato Grosso do Sul (CRO-MS), students from Uniderp Dentistry course, and the Brazilian Dentistry Association (ABO-MS) conducted an activity focused on promoting teeth brushing and oral health through engaging and educational games, emphasizing correct oral hygiene practices. This activity took place in May 2023 and involved 32 participants, including students and professionals engaged in the project

Photo 5-1 - Pictures of the *Smile in the Field* Project








Source: TTG Brasil (2023).

Easter Campaign

The campaign, which occurred in April 2023, involved a brief contextualization of TTG Brasil as the new administrator of Project Alpha and a presentation of the theatrical play 'The Monkey and the Old Woman.' In the end, Easter eggs and illustrated children's books were distributed to promote reading.

Photo 5-2 - Pictures of the Easter Campaign




Source: TTG Brasil (2023).

- **Cerrado Native Seed Collection - Santa Tereza Quilombola Community**

In August 2023, the seed collection training course began in the Santa Tereza Quilombola Community, located in the municipality of Figueirão/MS. The primary objective was to train the community to integrate the Cerrado Native Seed Network. This initiative aims to create job opportunities, generate income in the region, and meet the demand for seeds required for the upcoming restoration project to be implemented in the municipalities of Figueirão and Camapuã, in the state of Mato Grosso do Sul, in the coming years. The training was attended by 19 community residents.

Photo 5-3 - Pictures of the Cerrado Native Seed Collection project



Source: TTG Brasil (2023).

- **HSE campaigns with employees**

TTG Brasil has a schedule of monthly Health, Safety, and Environmental (HSE) campaigns designed for engaging in dialogue with employees.

Campaigns in 2023 focused on emphasizing the significance of reporting accidents and incidents, along with training on TTG Internal Procedures (IPs). Among these initiatives was the 'Yellow May' awareness campaign, which aimed to promote traffic education and raise awareness about adopting safe behaviors. It also aimed to elucidate the risks associated with 'Alcohol and Driving' and the use of psychoactive substances while operating a vehicle. Additionally, there were campaigns addressing environmental awareness, hand hygiene, safety distance, hepatitis, Brazilian spotted fever, and prevention of accidents involving forestry machinery.

Figure 5-1 - HSE campaign schedule

ttg brasil	CALENDÁRIO DE CAMPANHAS SSMA		
MÊS	SAÚDE	SEGURANÇA DO TRABALHO	MEIO AMBIENTE
JANEIRO	SAÚDE MENTAL	CONDIÇÕES CLIMÁTICAS DESFAVORÁVEL	
FEVEREIRO	COMBATE A DROGAS E ALCOOL	MANUSEIO SEGURO DE AGENTE QUÍMICOS	
MARÇO	CONSUMO DE ÁGUA	AVALIAÇÃO E PERCEPÇÃO DE RISCOS	DIA MUNDIAL DA ÁGUA
ABRIL	PROMOÇÃO DA SAÚDE E QUALIDADE DE VIDA	ABRIL VERDE	
MAIO	COMBATE AO TABACO	MAIO AMARELO	
JUNHO	HIGIENIZAÇÃO DAS MÃOS	DISTÂNCIA DE SEGURA	SEMANA DA PRESERVAÇÃO AMBIENTAL
JULHO	PREVENÇÃO E COMBATE A HEPATITES VÍRAIS	PREVENÇÃO DE ACIDENTES COM MÁQUINAS E EQUIPAMENTOS	
AGOSTO	ALIMENTAÇÃO SAUDAVEL	PREVENÇÃO DE INCÊNDIOS FLORESTAIS	
SETEMBRO	SETEMBRO AMARELO	ACIDENTES COM ANIMAIS PEÇONHENTOS	SEMANA DA ÁRVORE
OUTUBRO	OUTUBRO ROSA	COMPORTAMENTO SEGURO NO AMBIENTE DE TRABALHO	
NOVEMBRO	NOVEMBRO AZUL		
DEZEMBRO	DOENÇAS SEXUALMENTE TRANSMISSÍVEIS	DEZEMBRO LARANJA	COLETA SELETIVA

Source: TTG Brasil (2023).

Figure 5-2 – Monthly awareness campaign folders





ALCOOL E DROGAS:
IMPORTÂNCIA DA PREVENÇÃO

USO DE ALCOOL E DROGAS:

Você sabia que os transtornos mentais e comportamentais relacionados ao uso de álcool e outras drogas estão entre os motivos que mais afastam as pessoas do trabalho? Segundo a Organização Pan-Americana de Saúde (OPAS) e a Organização Mundial da Saúde (OMS), a dependência de álcool e a fármaco-dependência estão presentes em uma relação de tendências mundial de transtornos psicossociais no trabalho.

Reconhecendo como esta questão pode afetar a produtividade, a segurança e até mesmo as relações interpessoais no trabalho, elaboramos este conteúdo para explorar a importância da prevenção ao abuso de substâncias nas empresas tanto para preservar a saúde integral do trabalhador quanto para garantir a produtividade dentro das organizações.

OS PERIGOS DOS ABUSOS DE SUBSTÂNCIAS:

Uma das principais características de substâncias como álcool e outras drogas é que elas provocam dependência, ou seja, a pessoa passa a consumir uma quantidade cada vez maior para se satisfazer. Como consequência, as mudanças de comportamento acarretadas pelo uso afetam a vida pessoal e o trabalho.

CONSEQUÊNCIAS:

- Brigas em casa (abalando a estrutura familiar);
- Falta de paciência ou de cuidados com os filhos;
- Maior risco de contaminação por doenças sexualmente transmissíveis;
- Maior risco de acidentes em casa e/ou no trabalho (porque o julgamento do que é arriscado fica prejudicado);
- Maior ocorrência de atrasos e faltas no trabalho;
- Perda da produtividade no trabalho

EFEITO PARA O ORGANISMO:

- Pressão alta (hipertensão)
- Doenças cardíacas
- Taquicardia
- Doenças respiratórias
- Perda de memória
- Perda dos reflexos (movimentos lentos)
- Irritação e isolamento
- Falta de atenção
- Fraqueza
- Ansiedade
- Insônia
- Insônia
- Perda de apetite
- Dor de cabeça
- Tremores
- Sudorese (excesso de suor)
- Lesões cerebrais
- Náuseas e vômitos
- Convulsões
- Overdose
- Alucinações
- Coma
- Morte

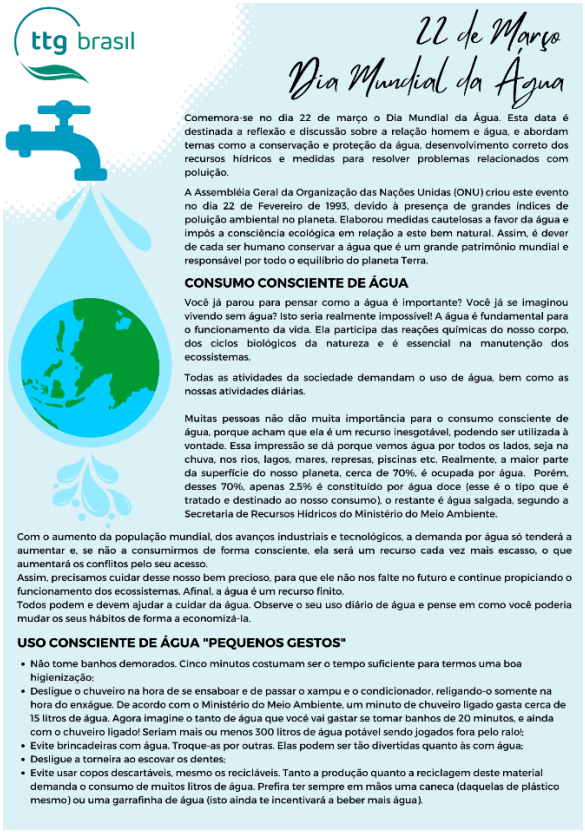
COMO PREVINIR E TRATAR ?

Prevenir é melhor que remediar. Esta máxima, sempre citada quando o assunto é saúde, também se aplica quando falamos sobre o consumo de substâncias. Confira abaixo 5 recomendações relevantes para prevenir e tratar o abuso de álcool e outras drogas

- Seja exemplo para aqueles que vivem com você. Ao evitar o uso de álcool e outras substâncias, você ajuda a prevenir esse tipo de comportamento entre pessoas da sua família.
- Caso perceba alguma das mudanças de comportamento ou sintomas aqui descritos, observe a relação com o consumo dessas substâncias e peça ou ofereça ajuda!)
- Esteja ciente de que a dependência química é uma doença e, a exemplo de qualquer outra, merece respeito e tratamento adequado.
- Aceite que, muitas vezes, para que o tratamento gere resultados, é preciso envolver o apoio da família, terapeutas, grupos de apoio e até centros de reabilitação.
- Converse abertamente com os menores sobre os riscos do consumo de álcool ou outras drogas. A prevenção deve começar ainda na infância e continuar na adolescência e vida adulta.

#VALORIZE A VIDA

ttg brasil



ttg brasil

22 de Março
Dia Mundial da Água

Comemora-se no dia 22 de março o Dia Mundial da Água. Esta data é destinada a reflexão e discussão sobre a relação homem e água, e abordam temas como a conservação e proteção da água, desenvolvimento correto dos recursos hídricos e medidas para resolver problemas relacionados com poluição.

A Assembléia Geral da Organização das Nações Unidas (ONU) criou este evento no dia 22 de Fevereiro de 1993, devido à presença de grandes índices de poluição ambiental no planeta. Elaborou medidas cautelosas a favor da água e impôs a consciência ecológica em relação a este bem natural. Assim, é dever de cada ser humano conservar a água que é um grande patrimônio mundial e responsável por todo o equilíbrio do planeta Terra.

CONSUMO CONSCIENTE DE ÁGUA

Você já parou para pensar como a água é importante? Você já se imaginou vivendo sem água? Isto seria realmente impossível! A água é fundamental para o funcionamento da vida. Ela participa das reações químicas do nosso corpo, dos ciclos biológicos da natureza e é essencial na manutenção dos ecossistemas.

Todas as atividades da sociedade demandam o uso de água, bem como as nossas atividades diárias.

Muitas pessoas não dão muita importância para o consumo consciente de água, porque acham que ela é um recurso inesgotável, podendo ser utilizada à vontade. Essa impressão se dá porque vemos água por todos os lados, seja na chuva, nos rios, lagos, mares, represas, piscinas etc. Realmente, a maior parte da superfície do nosso planeta, cerca de 70%, é ocupada por água. Porém, desses 70%, apenas 2,5% é constituído por água doce (esse é o tipo que é tratado e destinado ao nosso consumo), o restante é água salgada, segundo a Secretaria de Recursos Hídricos do Ministério do Meio Ambiente.

Com o aumento da população mundial, dos avanços industriais e tecnológicos, a demanda por água só tenderá a aumentar e, se não a consumirmos de forma consciente, ela será um recurso cada vez mais escasso, o que aumentará os conflitos pelo seu acesso.
Assim, precisamos cuidar desse nosso bem precioso, para que ele não nos falte no futuro e continue propiciando o funcionamento dos ecossistemas. Afinal, a água é um recurso finito.
Todos podem e devem ajudar a cuidar da água. Observe o seu uso diário de água e pense em como você poderia mudar os seus hábitos de forma a economizá-la.

USO CONSCIENTE DE ÁGUA "PEQUENOS GESTOS"

- Não tome banhos demorados. Cinco minutos costumam ser o tempo suficiente para termos uma boa higienização;
- Desligue o chuveiro na hora de se ensaboar e de passar o xampu e o condicionador, religando-o somente na hora do enxágue. De acordo com o Ministério do Meio Ambiente, um minuto de chuveiro ligado gasta cerca de 15 litros de água. Agora imagine o tanto de água que você vai gastar se tomar banhos de 20 minutos, e ainda com o chuveiro ligado! Seriam mais ou menos 300 litros de água potável sendo jogados fora pelo ralo!;
- Evite brincadeiras com água. Troque-as por outras. Elas podem ser tão divertidas quanto às com água;
- Desligue a torneira ao escovar os dentes;
- Evite usar copos descartáveis, mesmo os recicláveis. Tanto a produção quanto a reciclagem deste material demanda o consumo de muitos litros de água. Prefira ter sempre em mãos uma caneca (daquelas de plástico mesmo) ou uma garrafinha de água (isto ainda te incentivará a beber mais água).

Source: TTG Brasil (2023).

Photo 5-4 – Pictures of July 2023 HSE campaign





- **Operational dialogue**

The action involves disseminating the company's communication channels with the residents of neighboring communities and posting them on the company's information boards.

Photo 5-5 – Dissemination of the communication channels



Source: TTG Brasil (2023).

Photo 5-6 – Dissemination of the communication channels



Source: TTG Brasil (2023).

Figure 5-3 - Communication Channels



Source: TTG Brasil (2023).

Figure 5-4 - Letter to absent neighbors



Source: TTG Brasil (2023).

Figure 5-5 – Flyer with communication channels



Source: TTG Brasil (2023).

5.2. STAKEHOLDER DEMANDS AND THE METHODS, TOOLS, AND TECHNIQUES USED TO ADDRESS THEM

The primary demands and needs expressed by stakeholders concerning the region's vulnerabilities were mapped, along with concerns regarding potential impacts on current life dynamics due to the project. Below are the identified needs and recommended actions to be undertaken by TTG Brasil to mitigate these concerns.

Table 5-1 - Identified Stakeholder Demands

Groups	Demands	Recommended action	Objective
Populations within the administrative limits of Camapuã, Costa Rica and Figueirão – All	-	-	-
Public authority ADI – Headquarters of Camapuã, Costa Rica and Figueirão	* Lack of qualified labor in the municipality * Adequate infrastructure * City Hall is unable to meet the health, education, and social assistance demands of migrants * Lack of information about the project and concern about the consequences of its expansion	* Courses and training for local labor * Regular contact and direct communication	Mitigate the impacts of overload on public services and establish a good relationship, through direct and effective communication
Associations/Representative entities and community leaders	* Lack of information about the project and its expansion expectations	* Regular contact and direct communication	Establish a good relationship, through direct and effective communication
Media and means of communication	-	-	-
Directly affected neighboring residents of Project Alpha	* Lack of information about the project and its expansion expectations * Concern regarding the use and quality of water, considering the pesticides used and the quantity required by the plantation	* Regular contact and direct communication to address inquiries and other concerns	Reduce noise in communication to address inquiries and concerns about the project, aiming to establish good relationships and provide peace of mind for families
Civil Society – Santa Barbara Community	* Increase in the number of students * Enhance the structure of the accommodation (hall) * Provision of doctors and dentists with a set frequency at the health center *Concern regarding the increasing insecurity	* Partnership with public authorities * Regular contact and direct communication to address inquiries and other concerns	Continue to assess the need for and provide, if appropriate, basic services such as medical and security-related support. Ensure good relationships are maintained through direct and effective communications

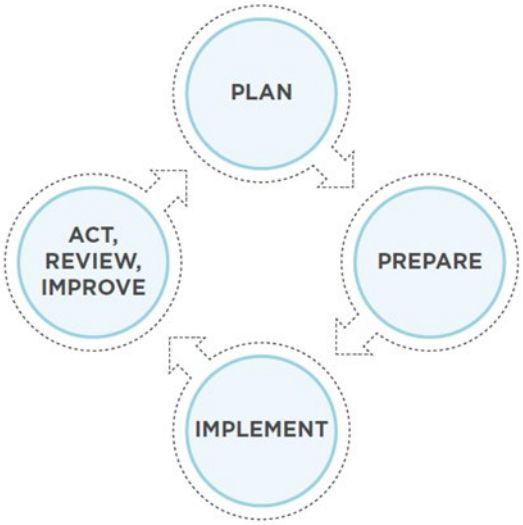
Groups	Demands	Recommended action	Objective
Santa Tereza Quilombola Community	* Employment and income, seek incentive to structure a business that creates jobs, something related to the cheese and/or sweets factory, to process part of the milk sold	* Courses and training for local labor	Encourage the development and better quality of life of this traditional community
Migrants	* Absence of information * Use of public services	* Courses and training for local labor * Disseminate information about the project and the expectations	Support the reduction of migration from other regions in search of work opportunities and qualify the newly arrived workforce
Internal workers	* Distance traveled daily between work and home * Lack of leisure * Lack of communication	* Encourage the creation of leisure spaces * Intensify the dissemination of the communication channels between companies and workers	Seek greater employee satisfaction so that they feel more welcome and contented
Livestock workers	* Employment	* Repurpose the workforce * Retrain the workforce * Relocate workers to another farm, if they are not interested in forestry activities	Mitigate the impacts caused by the project and provide workers with peace of mind

Source: Tetra Tech (2023).

5.3. STAKEHOLDER ENGAGEMENT PLAN

To achieve the proposed objectives, it is recommended that this plan be developed in accordance with the presented planning, considering all mapped stakeholders, the planned steps, and the proposed order. Generally, the Engagement Plan was developed and must be executed considering the cyclical nature of the engagement process, which comprises four action milestones: (i) Planning, (ii) Preparation, (iii) Implementation, and (iv) Reviewing and updating the Stakeholder Engagement Action Plan.

Figure 5-6 - Milestones of the Engagement Plan



Source: AccountAbility (2015).

In this sense, it should be reviewed, updated, and its implementation continued, taking into account the corporation's ongoing dialogue with stakeholders. The auxiliary tool must serve as the basis for this update, constituting a part of this deliverable.

5.3.1. Planning

5.3.1.1. Mapped social actors

The first action outlined within the Planning framework refers to the mapping and characterization of stakeholders, as previously presented in item 4.1. This mapping involves characterizing the involved parties based on their classification of interest, decision-making capacity, articulation, impact, nature, degree of influence, and the intensity of impact.

5.3.1.2. Determining the levels and methods of engagement

After completing the mapping process, the levels and methods of engagement are presented, considering the specificities of each stakeholder based on the earlier classification. Using these levels and methods, the intended nature of the relationship between TTG and the stakeholders is solidified within the planning scope. It is important to note that the nature and depth of involvement might evolve as the process progresses, and the proposed methods aim to better address the needs, capabilities, and expectations of the involved parties. Additionally, more than one method can be utilized for the same mapped group, and the same method can be applied to different groups.

Generally, consultation levels may encompass the described items below.

- **Information sharing as basically one-way communication**

This approach may be suitable as the primary form of public engagement in low-risk circumstances when the project is not actively pursuing dialogue with communities or other stakeholders. Engagement primarily involves transparently and accessibly disseminating project-related information to the public, along with providing a means for the public to request additional information or convey concerns and recommendations.

- **Consultation as a two-way dialogue**

In projects of moderate risk and complexity, especially those that might lead to adverse impacts triggering safeguard policies, stakeholders are engaged through an active two-way consultation process. Information needs to be shared with relevant stakeholders, often in a disaggregated form to accurately represent the local context. It is essential to record, document, and consider stakeholders' perspectives.

- **Participation and strengthening**

High-risk and complex projects require a more meaningful and informed engagement process with stakeholders. This reinforces the aforementioned principles of dialogue but entails a deeper involvement of stakeholders in defining and executing relevant project aspects. In specific high-risk scenarios, policies and best practices mandate stakeholder participation in project decision-making, transferring a degree of decision-making authority to local communities and stakeholder groups. An example is when a project requires the agreement or formal consent of affected stakeholders.

Expanding on this, the proposed methodology for this Plan, based on the AA1000 AccountAbility Standards (2015), outlines the following levels as presented in the table below.

Table 5-2 - Levels of engagement and corresponding proposed methods.

ENGAGEMENT LEVEL	ENGAGEMENT METHOD
Remain Passive No active communication between parties	• Stakeholder concerns expressed through protests • Letters • Media • Websites etc.
Monitor One-way communication: stakeholder > TTG	• Media and internet tracking. • Reports from other stakeholders possibly through targeted interviews
Advocate One-way communication: TTG > stakeholder	• Pressure on regulatory agencies • Other advocacy efforts through social media • Lobbying efforts
Inform One-way communication: TTG > stakeholder, there is no invitation to respond	• Bulletins and letters • Flyers • Reports and websites • Speeches, conferences and public presentations
Transaction Limited two-way engagement: organize and monitor performance in accordance with contracts	• Public-Private Partnerships • Private financing initiatives • Grant-making • Cause-related marketing
Consult Limited two-way engagement: TTG asks questions, stakeholders respond	Possible methods: • Research • Focus groups • Meetings with selected stakeholders • Public meetings • Workshops
Negotiate Limited two-way engagement: discuss a specific issue or range of issues with the aim of reaching consensus	• Collective bargaining with workers through their unions and/or representatives
Engage Two-way or multi-way engagement: Learning from all sides, but stakeholders and TTG act independently	• Multi-Stakeholder Forums • Advisory panels • Consensus-building processes • Participatory decision-making processes • Focus groups • Online engagement tools

ENGAGEMENT LEVEL	ENGAGEMENT METHOD
Collaborate Bidirectional or multidirectional engagement: joint learning for decision making and actions	• Joint projects • Joint ventures • Partnerships • Multi-stakeholder initiatives • Online collaborative platforms
Empower New forms of accountability; decisions delegated to stakeholders; stakeholders play a role in developing organizational agendas	• Integration of stakeholders into the organization's governance, strategy and operations

Source: AccountAbility (2015). Prepared by Tetra Tech (2021).

Item 5.3.3.2 presents the levels and methods of engagement for each mapped stakeholder group, along with the recommended actions.

5.3.2. Preparation

5.3.2.1. Resource Mobilization

TTG must mobilize personnel, material, and financial resources to implement this Plan. The outcomes of engagement can significantly impact operational strategy and management. These resources are crucial for the complete execution of the Engagement Plan, requiring experienced professionals and adequate infrastructure. Presented below is a minimum resource proposal for the comprehensive execution of the Plan in question.

Table 5-3 - Personnel and material resources proposed for execution of the Engagement Plan

RESOURCE	QUANTITATIVE	EXECUTION TIME
Team	1 dedicated professional, being: Full or Senior Social Analyst; Or Full or Senior Social Dialogue Analyst	The team responsible for executing the Engagement Plan and managing socio-institutional relationships should be involved from the project's planning phase through to the conclusion of activities.
Technology	- 1 laptop computer - 1 cell phone (with a plan that allows calls to other states)	
Mobility	Appropriate means of transportation	
Financial	Financial resources must cover salaries, the purchase of equipment and support materials, and the logistics related to community meetings. Expenses associated with structural works and training, among others, should be included in the planned program costs in order to mitigate the impacts of the project's operation.	

Source: Tetra Tech (2021).

5.3.2.2. Capacity building

Engagement processes typically to involve a variety of individuals with different levels of education, confidence, and experience. It is important to understand that some individuals and groups may have difficulty accepting invitations to engage, or circumstances may hinder their full participation in the engagement process.

Hence, the professionals involved in the Engagement Plan must receive proper training to effectively execute it, considering:

- Knowledge of the territory, its communities, their modes of operation, production, and the existing public and civil institutions;
- Familiarity with the Stakeholder Matrix, the Engagement Plan, the project to be implemented, and TTG's sustainability policies;

- Proficiency in relationship-building and communication skills.

5.3.3. Implementation of the Engagement Plan

5.3.3.1. Invitation to engagement

For this phase, arranging stakeholder-specific individual meetings is essential to facilitate personalized approaches and negotiations between the parties. Therefore, sending individualized, named invitations in advance is necessary; that must be sent in advance; containing:

1. The purpose and scope of engagement;
2. Schedule;
3. Expected contribution from stakeholders;
4. Benefits for stakeholders invited to participate;
5. Additional required information;
6. Next steps.

The most appropriate communication channels for the parties, considering that more than one means should be considered for the invitation, are:

- WhatsApp (invitation in non-editable format);
- Personal visits;
- Phone call.

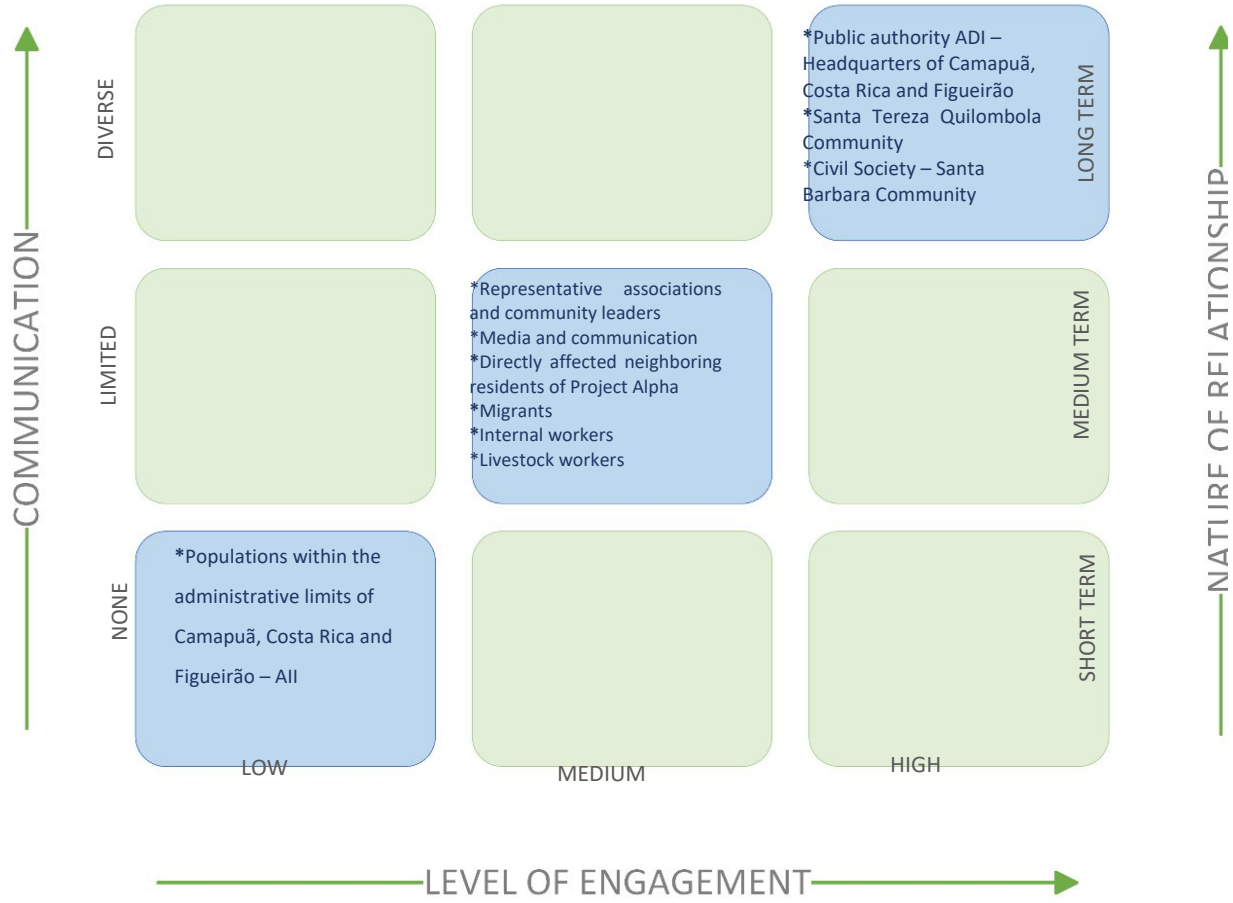
Meetings must be scheduled based on the availability of guests and on suitable locations. During these meetings, other informative materials will be distributed, always aiming for accessible language and keeping technical details to a minimum for better understanding of the project and the engagement process.

The initial materials provide the foundation for building strong stakeholder engagement. These materials should briefly address the following points:

- Information about the project;
- The nature of the problems and the associated risks and opportunities;
- How problems are currently managed in the organization;
- What policies and systems are already in place;
- What TTG Brasil is able and intends to do about the problems.

5.3.3.2. Engagement Execution

A prioritization of stakeholders was established by correlating the characteristics of stakeholders with their classification.



Source: Tetra Tech (2023).

See below the Detailed Action Plan, taking into account the characteristics of the mapped areas, the level and method of engagement, and the recommended actions.

Table 5-4 - Engagement strategy for each stakeholder group

Groups	Engagement level	Engagement method	Recommended actions
Populations within the administrative limits of Camapuã, Costa Rica and Figueirão – All	Remain Passive	• Stakeholder concern expressed through protests; media; websites etc.	No active communication between parties
Public authority ADI – Headquarters of Camapuã, Costa Rica and Figueirão	Inform	• Bulletins and letters • Flyers • Reports and websites	• Establish a robust institutional relationship is crucial to advocate for the project's interests, secure licenses, and comprehend the requirements and alignments related to project execution in the affected area. It is imperative to engage with the city government and all affected departments, providing comprehensive project information and outlining growth expectations and the influx of workers. As these are small municipalities significantly affected by the project, fostering partnerships and collaborative projects is essential. • Create open and direct communication channels for entrepreneur contact via WhatsApp, email, and social networks is necessary. • Aiming to build a solid relationship, hold biannual meetings to monitor and update the project's context and the municipality itself. • Prepare graphic materials with project information and environmental education and distribute them periodically, both online - via WhatsApp, email, and social networks – and in print during face-to-face meetings. • Designate a key contact person for institutional relations.
	Consult	• Research • Meetings with selected stakeholders	
	Transaction	• Public-Private Partnerships	
	Collaborate	• Joint projects • Partnerships • Multi-stakeholder initiatives • Online collaborative platforms	

Groups	Engagement level	Engagement method	Recommended actions
Associations/Representative entities and community leaders	Inform	• Bulletins and letters • Flyers • Reports and websites	• Given this group's power of persuasion and dissemination of news and mobilization, it is essential to formally inform entities, associations, and community leaders about the project's details. This includes the new activities at Project Alpha, the termination of livestock farming, and all significant project impacts. • Prepare graphic materials with project information and questions/trivia about forestry and distribute them periodically, both online - via WhatsApp and social networks – and in print during face-to-face meetings. • To encourage more dialogue and active listening, hold biannual meetings from the first meeting to align expectations and provide clarification. • Encouraging more dialogue is essential. Therefore, promote the complaint channels at all meetings and maintain active communication via WhatsApp. • Consider establishing partnerships for project execution tailored to each institution's needs.
	Consult	• Research • Meetings with selected stakeholders • Public meetings • Workshops	
	Collaborate	• Joint projects • Partnerships • Multi-stakeholder initiatives • Online collaborative platforms	
Media and means of communication	Inform	• Bulletins and letters • Flyers • Reports and websites	• For these stakeholders, capable of disseminating extensive information and responses, it is important to uphold an active monitoring system concerning project-related news. This approach ensures swift and effective dissemination of project news by these media channels, preventing the spread of potentially damaging false information that could harm the project's reputation. • TTG can also engage with them by sending performance reports.

Groups	Engagement level	Engagement method	Recommended actions
Directly affected neighboring residents of Project Alpha	Inform	• Bulletins and letters • Flyers • Reports and websites	• As this group is significantly affected by the project, establishing a robust relationship is paramount. Initially, the project and its anticipated impacts on the region must be officially presented to the group by a TTG representative. The meeting should address key concerns regarding water, mobility, and security, fostering an open dialogue where individuals feel free to ask questions and share comments. • Continuous and effective communication should be widely encouraged. To achieve this, efficient communication channels, such as WhatsApp, must be established. Monthly releases of graphic materials showcasing the progress of activities and general alerts regarding the application of agricultural pesticides or fire incidents, if any, will be shared through this platform. Additionally, bimonthly visits aimed at reinforcing the company's commitment to dialogue should be conducted.
	Consult	• Research • Focus groups • Meetings with selected stakeholders • Public meetings • Workshops	
Civil Society – Santa Barbara Community	Inform	• Bulletins and letters • Flyers • Reports and websites	• The stakeholder must be formally informed about the project and its details. This includes the new activities at Project Alpha, the termination of livestock farming, and all significant project impacts on the region. • Prepare graphic materials with project information and forestry questions/trivia and distribute them periodically, both online - via WhatsApp and social networks – and in print during face-to-face meetings. • To encourage more dialogue and active listening, hold biannual meetings from the first meeting to provide clarification. • Encouraging more dialogue is essential. Therefore, promote the complaint channels at all meetings and maintain active communication via WhatsApp. • Consider establishing partnerships for project execution tailored to each community's needs.
	Consult	• Research • Focus groups • Meetings with selected stakeholders • Workshops	
	Collaborate	• Joint projects • Partnerships • Multi-stakeholder initiatives • Online collaborative platforms	

Groups	Engagement level	Engagement method	Recommended actions
Santa Tereza Quilombola Community	Collaborate	• Joint projects • Joint ventures • Partnerships • Multi-stakeholder initiatives • Online collaborative platforms	• Consider establishing partnerships for project execution tailored to each community's needs. • An open and direct communication channel must be made available and promoted through WhatsApp to send materials with information about the project and environmental education. The channel should also be used to register inquiries about the project and the Cerrado Seeds project.
Migrants	Inform	• Bulletins and letters • Flyers • Reports and websites	• For these stakeholders, monitoring the dissemination of information about the project is recommended. Upon identifying such information, communication actions should be planned, including the distribution of digital materials, to manage expectations regarding job creation.
Internal workers	Inform	• Bulletins and letters • Flyers • Reports and websites	• Reinforcing communication channels and anonymous complaint mechanisms is crucial to ensure that workers feel comfortable making complaints and reports. • Graphic materials should be produced monthly to be sent on WhatsApp groups and posted on bulletin boards. These materials should cover topics on worker rights, leisure activities, forestry trivia and environmental education. • Anonymous polls must be carried out every six months after collective meetings. • Distribute suggestion boxes to get complaints, suggestions, and compliments from outsourced workers. These boxes should be opened weekly.
	Consult	• Research • Meetings with selected stakeholders • Workshops	

Groups	Engagement level	Engagement method	Recommended actions
Livestock workers	Inform	• Reports and websites	• It is essential to reach out to livestock workers affected by the activity's termination, aiming to align expectations and foster a space for dialogue. This enables them to express their opinions and feelings regarding the activity's termination. • An open and direct communication channel must be made available and publicized, so that the group receives, separately, updates with official information about the progress and prospect of the actual termination of the activity. The channel must remain active until the deactivation of the activity to register complaints and questions about the project. • It is important to consider negotiating the employment of livestock workers, ensuring they are assigned activities aligned with their interests. During the negotiation period, it is important to intensify communication to avoid misinformation and manage worker expectations.
	Consult	• Research • Meetings with selected stakeholders	
	Negotiate	• Collective bargaining with workers through their unions and/or representatives	

Source: Tetra Tech (2023).

Table 5-5 - Schedule

Groups	Activity	Year			
		1 quarter	2 quarter	3 quarter	4 quarter
Populations within the administrative limits of Camapuã, Costa Rica, and Figueirão – All	-	-	-	-	-
Public authority ADI – Headquarters of Camapuã, Costa Rica, and Figueirão	Presentation meeting	■			
	Follow-up and alignment meeting	■		■	
	Dissemination of open and direct communication channels	**Continuous**			
	Preparation and distribution of graphic materials	**Continuous**			
Associations/Representative entities and community leaders	Presentation meeting	■			
	Preparation and distribution of graphic materials	**Continuous**			
	Meeting to align expectations and provide clarification	■		■	
Media and means of communication	Submission of performance reports				■
Directly affected neighboring residents of Project Alpha	Presentation meeting	■			
	Preparation and distribution of graphic materials	**Continuous**			
	Visits	■	■	■	■
Civil Society – Santa Barbara Community	Presentation meeting	■			
	Meeting to align expectations and provide clarification	■	■	■	■
	Preparation and distribution of graphic materials	**Continuous**			
Santa Tereza Quilombola Community	Dissemination of open and direct communication channels	**Continuous**			
Migrants	Preparation and distribution of graphic materials	**Continuous**			
	Monitoring dissemination of information about the project	**Continuous**			
Internal workers	Preparation and distribution of graphic materials	**Continuous**			
	Opinion polls	■		■	
	Suggestion boxes	**Continuous**			
Livestock workers*	First alignment meeting	■			
	Dissemination of open and direct communication channels	■			

Source: Tetra Tech (2023).

*The actions must be carried out until the termination of the livestock activity, in November/2023.

5.3.3.3. Documentation of meetings and their results

TTG Brasil has the Management Procedure (PG001) concerning document control. This procedure establishes minimum content guidelines that should be presented. They include objectives, field of application, references, definitions, procedures, and registration

All work carried out and its results must be documented considering the information mentioned above, in addition to the following information:

- The methods used;
- Who participated and who did not participate;
- The period of time;
- A summary of stakeholder concerns, expectations, and perceptions;
- The results and directions (e.g., consultations, proposals, recommendations, decisions, and agreed actions).

As mentioned in the Management Procedure, the document must be stored for five years, except in cases where legislation requires different periods.

5.3.4. Review and update

The cyclical nature of the stakeholder engagement process demands constant monitoring, reviewing, and updating of the Stakeholder Matrix, of this Engagement Plan, and of associated future action plans.

5.4. GRIEVANCE MECHANISM

For the engagement cycle to be effective, establishing a direct communication channel between the communities within the project's area of influence and the responsible company is crucial. This enables prompt, clear, and objective responses to the demands received. Even projects with robust planning and adherence to stringent sustainability standards must remain open to listening to stakeholders. This approach serves to reduce, avoid, or address potential complications during the construction and operation of the project.

TTG Brasil follows a comprehensive Socio-Environmental Demands Management procedure (ISG 006), which outlines the necessary steps for addressing socio-environmental demands within the company's operational areas.

Figure 5-7 - Flowchart of the socio-environmental demands management process



Source: TTG Brasil (2023).

The procedure determines the priority of service, deadline for responses, the professional responsible for the service, and the registration process, as presented below.

Figure 5-8 - Deadlines for returning demands

Tipo de demanda	Descrição	Demanda Específica	Prazo para Resposta	Aprovação
Desabafo	Descrição de situação sem poder de atuação da empresa	-	Imediato sem ação	-
Agradecimento	Agradecimento e/ou elogios por ações/atividades	-	Imediato sem ação	-
Doação	Solicitação de doação ou patrocínio	Doação de Madeira e/ou materiais descartados pela empresa; Doação/Patrocínio de valores	30 dias úteis	Coordenação/ Gerencia
Denúncia	Comunicação de eventos extraordinários de operações e/ou em áreas de propriedade da TTG Brasil	-	5 dias	Supervisão / Coordenação
Reclamação	Incômodo causado pelas operações realizadas em áreas administradas pela TTG à comunidade	Poeira; Ruído; Tráfego intenso; Condições da estrada	15 dias úteis	Supervisão / Coordenação / Gerencia

Dúvida	Questionamento sobre as operações realizadas em áreas administradas pela TTG e/ou atuação	-	15 dias úteis	-
Comunicado TTG	Informações operacionais às comunidades no entorno: comunicado operacional,	-	Imediato sem ação	-
Solicitações	Diversos	Verificação de divisa	20 dias úteis	Supervisão / Coordenação
		Passagem esporádica dentro de propriedade; Evento em área administrada pela TTG	15 dias úteis	Supervisão / Coordenação
		Investimentos	30 dias úteis	Coordenação / Gerência
		Empregos	30 dias úteis	-
Sugestão	Melhora de estradas	-	20 dias úteis	Supervisão / Coordenação
	Investimentos	-	30 dias úteis	Coordenação / Gerência

Source: TTG Brasil (2023).

Once the demand is determined as either accepted or rejected, the person in charge concludes the request with the socio-environmental area and issues the response letter. The performance report should include the statistical treatment of the receipt and resolution of demands.

Although the Social and Environmental Demands Management document (ISG 006) does not specify the communication channels for contact, the Disclosure and Communication Management procedure (PG 007) provides indications:

- Space on the website: There is a link available on the TTG Brasil website.
- Suggestion boxes: Questions collected from the boxes every fortnight are inserted into the FG 007.02 Communication Record spreadsheet. They are then sent to the responsible person for necessary action.
- Email address: There is an email address available, contato@ttgbrasil.com
- Hotline with the company: 0800891 463. This is an independent channel for secure, confidential, and anonymous reporting.

Although these communication channels are active, they are not accessible to all stakeholders mapped at Project Alpha due to the lack of telephone signal in the farm area. In addition, communication via email or website may not be available for everyone. It has been observed that WhatsApp is the preferred and most commonly used communication method among stakeholders. Therefore, it is recommended to officially incorporate this channel as a means for lodging complaints and facilitating communication between stakeholders and the project. It has also been observed that while a WhatsApp number is provided in one folder, it is absent in the others. All received contacts should be recorded and categorized for subsequent statistical analysis, specifying their nature (request, complaint, compliment, etc.), and establishing appropriate closing deadlines.

5.5. MONITORING AND REPORTING

The person responsible for the engagement must systematically monitor and evaluate the overall quality of the work carried out with stakeholders. The following aspects should be considered:

- Commitment and integration;
- Purpose, scope and stakeholder participation;
- Process (planning, preparation, involvement, action, review and improvement);
- Stakeholder perception and satisfaction surveys regarding the project;
- Products and results;
- Press releases.

Monitoring and evaluation are processes that help improve performance and achieve results. The ultimate goal concerning stakeholder engagement is to enhance both current and future management of engagement outcomes and impacts.

Monitoring and evaluation must be based on the criteria outlined in this Plan, which must be evaluated and updated periodically. Each individual engagement must be monitored and evaluated. Information from individual engagements must be aggregated to the work as a whole and evaluated in the broader context of the process.

In addition to monitoring and evaluating the entire process, monthly activity monitoring reports should be prepared following meetings, programs, or community actions. These reports will serve for internal records and should also be disseminated to stakeholders in a simpler and more accessible language. Annual reports on monitoring and activities carried out must also be prepared for internal records and presentation.

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