CARRINHO GROUP, SA

ENVIRONMENTAL AND SOCIAL IMPACT STUDY OF THE BALOMBO-BENGUELA SILO CENTER

TECHNICAL REPORT

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Lobito-Angola

INITIAL NOTE

This document is a Technical Report on the Environmental and Social Impact Study of the BALOMBO SILO PLANT, in the province of Benguela, municipality of Balombo. It was prepared by the company HSG - CONSTRUÇÃO, ENGENHARIA E COMÉRCIO, LDA

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Reviewed by HSG (consultant)

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LIST OF ACRONYMS AND ABBREVIATIONS

- ADA - Directly affected area
- EIA: Environmental Impact Assessment
- AID - Area of direct influence
- IIA - Indirectly Affected Area
- WB: World Bank
- CFB - Benguela Railways
- DHANA - Human Right to Adequate Food and Nutrition
- EDA: Agricultural Development Station
- EEs-Specialized Companies
- EIA-Environmental Impact Assessment
- ENDE-National Electricity Distribution Company
- EN-National Highway
- EPASB-Benguela Public Water and Sanitation Company
- EPC-Collective protective equipment
- PPE-Personal Protective Equipment
- WWTP-Wastewater Treatment Plant
- FAO-United Nations Food and Agriculture Organization
- IDA: Institute for Agricultural Development
- INE-National Statistics Institute
- IPA-Artisanal Fisheries Institute
- LP - Preliminary License
- MINAGRIP: Ministry of Agriculture and Fisheries
- MIP – Integrated Pest Management
- MSGR: Suggestion and Complaint Management Mechanism
- The Economic and Social Development Fund – FDES
- SDG - Sustainable Development Goals
- ILO: International Labor Organization
- PDAC: Angola Commercial Agriculture Development Project

- NDP-National Development Plan
- PENSA-Plans such as the National Strategy for Food Security
- PGA-Environmental Management Plan
- PGAS: Environmental and Social Management Plan
- SME: Small and Medium Enterprises
- PND-National Development Plan
- RAPP-Agricultural and Fisheries Census
- EIR-Environmental Impact Report
- TDR: Terms of Reference
- UN-United Nations
- GBV: Gender-Based Violence

1 EXECUTIVE SUMMARY

This report concerns the Environmental and Social Impact Assessment (ESIA) for the construction of agricultural infrastructure "Silos" in the municipality of Balombo, Benguela province.

The project proponent is Carrinho, SA, which submitted an application to **the U.S. International Development Finance Corporation (DFC)** for project financing through the **African Development Bank (AFDB).**

In preparing this study, the provisions established in Angolan legislation were taken into account, as well as the guidelines of the AfDB and DFC, duly mentioned and detailed in Chapter 3, which also presents the Institutional Framework of the main entities involved in the agriculture sector, as well as the Ministry of the Environment.

At this stage of the Environmental and Social Impact Assessment, the aim is to identify the activities planned for the implementation of the Project, analyze their possible impacts, and define the corresponding mitigation measures.

The municipality of Balombo covers 2,635 km² and has approximately 108,965 inhabitants. It is bordered to the north by the municipality of Cassongue, to the east by the municipality of Londuimbali, to the south by the municipalities of Ucuma, Chinjenje, and Ganda, and to the west by the municipality of Bocoio.

Administratively, the municipality consists of the commune-headquarters, corresponding to the city of Balombo, and the communes of Chindumbo, Chingongo, and Maca Mombolo.

The municipality of Balombo stands out as a region with significant agricultural potential, especially in grain cultivation. Family farming is predominant, focusing on crops such as corn, beans, massango, and massambala, which are fundamental to local food security. Agricultural development programs have been implemented to support family farmers, providing inputs and technical assistance, with the aim of increasing productivity and replacing imports with local production.

The arable land in Balombo is characterized by fertile soils, suitable for growing a variety of crops, especially grains. The availability of water for irrigation is a crucial factor

, and efforts have been made to improve access to water resources in order to ensure the sustainability of agricultural production. The combination of fertile soils and initiatives to support farmers positions Balombo as a strategic area for agricultural development in Benguela province.

Taking advantage of the potential that this municipality offers in terms of grain production, the Carrinho group intends to build agricultural infrastructure "Silos," with the aim of facilitating the storage and distribution of grains from various points in the municipality and other regions, not only to mitigate and reduce post-harvest losses, but also to encourage farmers to increase production, contributing to food security and economic development in the region.

The proposed project will be implemented in an area corresponding to 10,971 m^2 and will be built using reinforced concrete, wire mesh, metal structures, and sheet metal, etc.

The project consists of the construction of grain storage silos with a storage capacity of 20,000 tons, which are expected to store the following products: corn and wheat.

The silos, with a storage capacity of 20,000 tons, consist of:

- 1 weighbridge with a capacity of 60 tons;
- 1 road reception circuit with a capacity of 160m³/h (120t/h), with pre-cleaning of straw;
- 2 conical bottom storage silos with a total capacity of approximately 1350m³, i.e., 500 tons capacity for each silo. For example, Ø8.9m, cylinder height 14.94m, and total height 17.48m;
- 1 dryer with an output capacity of 50 t/h for corn;
- 4 flat-bottom silos for storage distributed in a line, with a total capacity of approximately 26,700 m³, i.e., 5,000 tons of capacity for each silo. For example, Ø19.54 m;
- Aeration system in storage silos;
- 1 road dispatch circuit with a capacity of 135 m³/h (100 t/h);
- Electrical installation;

- Supervision system.

The main environmental conditions at the project site are described below.

The municipality of Balombo has a dry tropical climate, with two distinct seasons: a rainy season and a dry season. The rainy season generally runs from October to April and accounts for most of the annual rainfall, which is around 800 to 1,000
mm. The dry season, which runs from May to September, is marked by low rainfall and milder temperatures, especially during the cacimbo period (June to August).

Average annual temperatures range from 18 °C to 28 °C, with significant daily fluctuations. This climate strongly influences local agricultural activity, requiring farmers to adapt their crop cycles to water availability. The irregularity of rainfall in some years poses a challenge to sustainable production, especially in rainfed areas.

The soils of Balombo are predominantly sedimentary in origin, with a marked presence of ferruginous and sandy soils, mixed with clay soils in the valley areas. In general, these are moderately fertile soils, with some water retention capacity and reasonable depth, which makes them suitable for rainfed agriculture, especially for crops adapted to local conditions, such as corn, beans, massango, and cassava.

However, in many areas, soils have limitations related to acidity and low concentrations of organic matter and essential nutrients, requiring corrective practices and fertilization to ensure good productivity. Erosion is also a concern, especially on deforested or poorly managed slopes, which can compromise long-term fertility. The combination of traditional agricultural practices, limited use of soil conservation technologies, and climate variability reinforce the need for sustainable soil use and management strategies to ensure its continued productivity.

The municipality is crossed by several small and medium-sized watercourses, the most important being the Balombo, Catapi, and Cubal rivers. These rivers are part of the local river basins and are fundamental for supplying water to the population, agricultural irrigation, and livestock farming.

livestock breeding. Although their flow varies throughout the year, especially affected by the rainy and dry seasons, these watercourses are a vital source for the municipality's subsistence and rural development.

The importance of Balombo's water resources is mainly associated with rainfed agriculture, but they are also used in small areas of irrigated cultivation, allowing for the planting of vegetables and crop diversification. In addition, they play an important role in maintaining local ecosystems and supplying domestic water. However, there are challenges related to water collection, conservation, and efficient management, especially during periods of drought, which reinforces the need for investment in sustainable water infrastructure, such as small retention systems, irrigation channels, and soil water conservation techniques.

The vegetation in the municipality of Balombo is predominantly savanna, with open forests, shrubs, and grasses typical of regions transitioning between humid and dry tropical climates. The more humid areas close to watercourses have denser vegetation, with small patches of gallery forest and larger tree species such as baobab, acacia, and miombo.

This vegetation cover, although subject to human activity such as extensive agriculture, burning, and deforestation for charcoal production, still plays an important role in soil conservation and the ecological balance of the region. The vegetation also supports traditional agricultural practices, providing natural pasture and firewood for domestic use. The conservation of local vegetation is essential to mitigate soil erosion and preserve water resources.

The main source of air pollution in the area is road traffic, although in reality its effects are hardly noticeable given the low volume of traffic and the constant winds that blow practically all year round.

The sound environment is also relatively quiet, with no significant noise disturbances.

From an ecological point of view, the installation of the silos is not expected to have a significant impact on local biodiversity, as the area is heavily subject to anthropogenic changes. Deforestation and stripping will be necessary, although restricted to the perimeter granted to Carrinho-Agri. The surrounding vegetation is subject to constant burning by the local population, thus reducing its diversity. No endangered or threatened species of fauna and flora were observed in the immediate vicinity of the project.

From a landscape perspective, the intervention area is part of a semi-natural urban zone, characterized by human occupation coexisting with areas of sparse natural vegetation, affected by constant burning, which impacts its visual quality.

The municipality of Balombo has a population of around 108,965, of whom 51,050 are male and 57,915 are female. Balombo has a young and dynamic population, with more than half of its residents of working age and a young population that far outnumbers the elderly.

The population of Bailundo has a low level of education, with a literacy rate of 43.4%.

The employment rate is 69.0%. Most of the population works in the primary sector (agriculture, animal production, hunting, forestry, and fishing) and the tertiary sector (commerce and services).

As part of the EIAS work, the following entities were contacted: Benguela provincial government, Balombo municipal administration (municipal department of environment and basic sanitation).

These entities are in favor of the project's implementation, as it will have significant implications for the economic revitalization of the municipality.

The main negative environmental impacts of the project will occur during the construction phase and relate to noise and dust caused by heavy and light vehicle traffic, and potential disturbance to the surrounding population. It is expected that the implementation of mitigation measures and monitoring programs will keep the negative impacts during the construction phase to a minimum.

At this stage, another positive impact to be noted is the boost to the local economy resulting from the construction activity, creating jobs and stimulating local trade in restaurants and accommodation for an estimated period of 24 months.

During the project's operational phase, the negative impacts are associated with situations of potential risk, although these are unlikely to occur with the adoption of the proposed measures, namely accidental spills of polluting substances, noise, dust, and road accidents involving the population.

It is during the operational phase that all the benefits of the project will materialize, in the form of improved socioeconomic conditions for the population of Balombo and the surrounding area. At this stage, it is expected that the population will be able to sell their grain at a competitive price and receive incentives to increase their productivity and improve their cultivation and storage techniques.

The main measures to mitigate negative impacts are aimed at ensuring minimal disruption to the areas involved and reducing environmental and social impacts during the construction and operation phases. Among these, the following stand out:

Table 1: Summary of mitigation measures (Construction Phase)

Descriptor	**Impact**	**MITIGATION MEASURES**
Climate	Change in Evapotranspiration and Temperature at ground level	Limit excavation and waterproofing to areas where strictly necessary.
Geology and geomorphology	Change in local geomorphology	Limit excavations to areas where strictly necessary.
Soils	Reduction in water infiltration capacity	The movement of machinery and other equipment involved in the work must be strictly confined to the designated areas.
	Contamination due to spillage	Keep equipment and machinery in good working order; maintenance must be carried out in a safe and waterproof location;
Surface water resources	Contamination of waterways by accidental spills and/or runoff of waste and solid sediments	Keep machinery and vehicles in good working order; do not perform maintenance in unsealed locations that are unsafe;
Water resources **Contamination of aquifers by accidental spills and/or runoff of waste and solid sediments**	Contamination of aquifers by accidental spills and/or runoff of waste	Keep machinery and vehicles in good working order; do not perform maintenance in inappropriate locations;
<u>Flora</u>	Disturbance and destruction of native flora	• Prevent degradation of existing vegetation cover by restricting vehicle traffic areas; • Raise awareness among workers and communities about the importance of the areas created and the species that inhabit them, especially endemic and endangered species. • Compensatory reforestation with native species (minimum 2:1) in nearby degraded areas

Descriptor	Impact	MITIGATION MEASURES
Flora	Disturbance and destruction of native flora	• Installation of temporary vegetation barriers and signage to prevent species from being run over; • Protection of sensitive areas and waterways with sediment barriers; • Creation of a perimeter green belt with native trees
<u>Fauna</u>	Disturbance of local fauna	• Raise awareness among workers and communities about the importance of preserving endemic or endangered species; • Reduce the speed of machinery and vehicles to prevent wildlife from being run over and killed species.
Landscape	Landscape alteration	Support infrastructure, materials, and equipment should be established in appropriately selected areas selected areas in order to avoid dispersion;
Air quality	Air quality degradation (particulate and gas emissions)	• Avoid driving vehicles and machinery at high speeds, obeying the speed limits (60 km/h and 30 km/h) near and within towns; • Moisten areas where dust may be generated;
Noise pollution	Increased noise levels	• Avoid high-speed vehicle traffic, complying with the established limits (60 km/h and 30 km/h) near and within localities; • Perform regular maintenance on equipment and machinery, and use them only when strictly necessary; • Establish work schedules (e.g., 8:00 a.m. to 5:00 p.m.).

Descriptor	Impact	MITIGATION MEASURES
Socioeconomics	Job creation	• The creation of new unskilled jobs should primarily benefit the populations living in the immediate vicinity of the infrastructure; • All labor employed by the Silos Plant will comply with the provisions of international conventions on the protection of the rights of children and workers to which Angola is a signatory through the International Labor Organization (ILO), as well as the provisions of the AfDB Integrated Safeguard System, namely Operational Safeguard 5. , namely Operational Safeguard 5.
Socioeconomics	Boosting the local economy and associated sectors associated with it	Materials to support this phase should preferably be purchased on the local market;
Pressure on the road network and urban infrastructure (water, energy, and sanitation)	Pressure on the road network and urban infrastructure (water, energy, and sanitation)	• Comply with the established speed limits (60 km/h and 30 km/h) near and within towns, and reduce speed on unpaved roads; • Wastewater should be properly stored in appropriate containers in a safe area; • Raise awareness and promote the rational use of water and energy.
Waste	Risks of environmental contamination	• The contractor shall adopt a Waste Management Plan to ensure the efficient management of waste generated on site and its temporary storage. A specific area shall be created on site for the selective disposal of waste, which shall be covered and equipped with big bags and metal or plastic containers, properly identified according to the type of waste to be disposed of. • The disposal of non-hazardous waste must be carried out by a company duly licensed for this purpose. • All polluting substances used must be stored in appropriate locations with restricted access and properly waterproofed to reduce the risk of accidental spills. The contractor shall adopt a Waste Management Plan based on the following guidelines.

Table 2: Summary of mitigation measures (Operation Phase)

Descriptor	Impact	MITIGATION MEASURES
Climate	Increased perception of heat discomfort	Promote the restoration of intervened areas by planting gardens and trees that are suited to the area;
Geology and geomorphology	Change in local geomorphology	• Take into account the micro-basin of the region in order to effectively direct rainwater; • Avoid exposing areas that will not be used in the short term;
Soils	Reduction in water infiltration capacity	The movement of machinery and other equipment involved in the work must be strictly confined to the designated areas;
	Soil contamination due to accidental spills	• Keep equipment and machinery in good working order; maintenance should be carried out in a safe, waterproof location; • Have a spill and emergency response kit available
Surface water resources	Contamination of waterways by accidental spills and/or runoff of waste and solid sediments	• Generators and other equipment must be maintained in a specific, waterproofed area with the necessary safety conditions; • Have an emergency spill kit available;
Groundwater resources	Contamination of the aquifer by accidental spills and/or runoff of waste	• Store waste and other hazardous liquid products in suitable containers placed on spill containment basins; • Have an emergency spill kit available

Descriptor	Impact	MITIGATION MEASURES
Flora	Disturbance and destruction of native flora	• Prevent degradation of existing vegetation cover by restricting vehicle traffic areas; • Raise awareness among workers and communities about the importance of the areas created and the species that inhabit them, especially endemic and endangered species. • Support local associations focused on flora research and preservation. • Maintenance and expansion of green belt with species attractive to wildlife • Six-monthly monitoring of flora and corrective actions
Wildlife	Disturbance of local fauna	• Raise awareness among workers and communities about the importance of preserving endemic or endangered species • Reduce the speed of machinery and vehicles to prevent species from being run over and killed. • Six-monthly monitoring of fauna and corrective actions
	Pest infestation	• Develop a pest control plan; • Periodic disinfestation of facilities • Installation of artificial nests and refuge boxes to attract natural predators of pests
Landscape	Landscape alteration	• Keep the facilities in good condition; • Do not use colors that contrast with the surrounding landscape; • Night lighting should be directed downward.

Descriptor	Impact	MITIGATION MEASURES
Air quality	Degradation of air quality (emissions of particles, gases, and odors)	• Avoid high-speed traffic and machinery, complying with the established speed limits (60 km/h and 30 km/h) near and within towns; • Moisten areas where dust may be generated; • Perform regular maintenance on equipment and machinery, and use them when strictly necessary. All waste must be correctly stored in suitable containers to mitigate odor emissions;
Noise environment	Increased noise levels	• Avoid high-speed vehicle traffic, complying with the established limits (60 km/h and 30 km/h) near and within localities; • Perform regular maintenance on equipment and machinery, and use them only when strictly necessary.
Socioeconomics	Job creation	• The creation of new unskilled jobs should primarily benefit the populations closest to the infrastructure; • All labor employed by the Silos Plant will comply with the provisions of international conventions on the protection of the rights of children and workers to which Angola is a signatory through the International Labor Organization (ILO), as well as the provisions of the System. Integrated into the AfDB Safeguards, namely Operational Safeguard 5.
Socioeconomics	Boosting the local economy and associated sectors	• Provide technical support and knowledge of good agricultural practices to the most disadvantaged populations, in order to obtain higher yields and strengthen crops, thus contributing to the fight against poverty. • Set fair and competitive prices for the purchase of grain, which will encourage increased production by individual farmers and existing cooperatives

Descriptor	Impact	MITIGATION MEASURES
Infrastructure	Pressure on the road network and urban infrastructure (water, energy, and sanitation)	• Comply with the established speed limits (60 km/h and 30 km/h) near and within towns, and reduce speed on unpaved roads; • Transport goods at pre-established times, avoiding congested routes whenever possible; • Wastewater must be properly stored in appropriate containers in a safe area; • Monitor water and energy consumption and waste production, drawing up a plan to reduce them;
Waste	Risks of environmental contamination	• Develop and implement a waste management plan; • Install equipment (recycling bins) that facilitates the segregation and reuse of waste in accordance with the waste management plan (WMP), and encourage practices aimed at reducing waste production; • The disposal of non-hazardous waste must be carried out by a company duly licensed for this purpose; • All polluting substances used must be stored in appropriate locations, with restricted access and properly waterproofed, in order to reduce the risk of accidental spills.

Implementation of the Environmental and Social Management Plan (ESMP)

The implementation of the Environmental and Social Management Plan (ESMP) is an essential step in ensuring that the construction and operation of the grain storage silos are conducted in an environmentally responsible and socially sustainable manner. This plan defines the preventive, mitigating, and corrective measures to be applied to minimize negative impacts and maximize benefits for local communities and the environment.

The ESMP covers actions related to waste management, control of atmospheric emissions and noise, preservation of water and soil quality, promotion of occupational health and safety, and mechanisms for communication and community involvement, etc. Its implementation will be accompanied by a continuous monitoring system and periodic reports, ensuring compliance with Angolan legislation and applicable international standards, as well as transparency towards stakeholders.

Some **key indicators of PGAS implementation** that can be monitored during the construction and operation phases of grain silos:

- **Air quality** – dust levels (PM_{10}, $PM_{2.5}$) and equipment emissions.
- **Environmental noise** – sound pressure levels near sensitive areas.
- **Water quality** – physical, chemical, and microbiological parameters.
- **Waste management** – amount generated, segregation, and final destination.
- **Resource consumption efficiency** – volume of water and energy consumed.
- **Occupational health and safety conditions** – number of accidents/incidents recorded.
- **State of vegetation and soil** – impacted areas and recovery actions.

- **Compliance with mitigation measures** – percentage of PGAS measures implemented.
- **Community engagement** – number of consultations, complaints, and resolutions.
- **Training and capacity building** – number of workers trained in environmental and safety issues, etc.

The presentation of the costs associated with the implementation of the Monitoring Programs proposed in this environmental and social impact assessment (ESIA) is structured in two phases: Construction Phase and Operation Phase.

Table 3: Program implementation costs

Programs	Cost estimate (annual)	
	Construction phase	Operation Phase
Effluent monitoring plan stored in septic tanks	3,500 USD	8,200 USD
Worker health and safety plan	$8,000	10,000 USD
Atmospheric emissions monitoring program and air quality monitoring program	12,000 USD	$15,000
Noise level monitoring program	4,500 USD	6,000 USD
Environmental education program	12,000 USD	18,000 USD
Biodiversity monitoring program	7,500 USD	9,000 USD
Emergency plan	8,000 USD	16,000 USD
Waste monitoring and management program waste	4,500 USD	8,000 USD
Pest control and eradication plan		12,000 USD
Communication and stakeholder relations program stakeholders	18,000 USD	22,000 USD
Mechanism for submitting 10,000 USD	10,000 USD	12,000 USD
Environmental and social performance audits		USD 20,000
Total	**88,000 USD**	**156,200 USD**

The financial costs related to the implementation of monitoring programs during the construction phase will be borne by the contractor.

The costs of implementing the monitoring programs during the operational phase will be borne by Carrinho, SA.

The conclusions of the EIAS are that the project is environmentally viable with the effective adoption of the proposed mitigation measures.

It should also be noted that the province of Benguela has all the institutional capacity to successfully implement the project proposed by the Carrinho, SA group. Nevertheless, Carrinho, SA will have to strengthen its environmental and social capacities by hiring a technician qualified to deal with environmental and social issues in accordance with the requirements defined by the financing institution.

Summary of Public Consultation and Participation

Public consultation is a mandatory step in the Environmental Impact Assessment process, as established by the Basic Environment Law (Law No. 5/98 of June 19), Presidential Decree No. 117/20 of April 22, and Executive Decree No. 87/12 of February 24, which regulate public participation in environmental matters. This procedure aims to ensure transparency, inclusion, and participation of communities, local authorities, and other stakeholders in the analysis of projects with potential environmental and social impact, a requirement also reinforced by the African Development Bank (AfDB) through its Operational Safeguard No. 1, which requires free, prior, and informed consultations.

As part of the Agricultural Infrastructure Construction Project "Silos" in the province of Benguela, a consultation session was held on June 13, 2025, with nine (9) representatives of the local administration of the municipalities of Lobito, Ganda, and Balombo, addressing the presentation of the project, the main environmental and social impacts, the proposed mitigation measures, and gathering contributions, comments, and recommendations from participants.

During the public consultation session on the Agricultural Infrastructure Project – Grain Silos, representatives from municipal administrations and provincial offices expressed their support and offered constructive comments. The Balombo Municipal Administration highlighted its previous experience with Carrinho Agri and the availability of land for infrastructure, committing to its full support for the project. The Lobito Municipal Administration emphasized the strategic advantage of the port location and the expected positive impact on local communities. The Administrator of Ganda highlighted the increase in storage capacity from 8,000 to 28,000 tons as a significant gain. The Provincial Office for Integrated Economic Development reinforced the project's alignment with the goal of food self-sufficiency and the importance of adequate processing and storage. The Provincial Office for the Environment, Waste Management, and Community Services emphasized the importance of public consultation and noted that the project does not have significant environmental impacts. Finally, the Provincial Office of Agriculture, Livestock, and Fisheries expressed great optimism and assured the agricultural sector's support for the project's implementation.

In response, the project coordination team confirmed that it will adopt all recommendations, ensuring the formalization of spaces, institutional integration, ongoing dialogue, prioritization of strategic municipalities, implementation of a Complaints Mechanism, and continuous information sharing to support public policies and maximize the socioeconomic benefits of the project.

Dialogue and Complaints Register

Following the presentation of the project on June 13, 2025, to the Benguela Municipal Administration, it was agreed that the information would subsequently be shared with the local community. Thus, on February 20, 2026, at 9:00 a.m., in the Municipal Education Directorate Union Room, a public consultation meeting was held in the municipality of Balombo, chaired by the Secretary-General of the Municipal Administration, Dr. João Tcombela Jaka, representing the Municipal Administrator.

The meeting was attended by members of the Municipal Executive, namely advisors and directors from different departments, as well as representatives from the Carrinho Group, traditional authorities, members of the Community Consultation Council, and representatives from civil society. During the session, Edmar Martins, representing the Carrinho Group, presented the Agricultural Infrastructure Project, which provides for the construction of silos and warehouses for the packaging and storage of cereals in the municipality.

In his speech, the representative highlighted the project's framework and its potential socioeconomic impact, emphasizing that the initiative aims to boost the local agricultural sector, increase the production of cereals and oilseeds, improve market efficiency, and strengthen the supply of goods to communities. The main environmental and social instruments were also presented, as well as the expected risks and impacts.

Community members expressed unanimous support for the implementation of the project, recognizing the municipality's agricultural potential. The session ended with words of encouragement from the Secretary-General, who stressed the strategic importance of the project for national productivity and local job creation.

A total of 54 individuals were present, of whom 38 were male and 6 were female.

Executive Summary

This report concerns the Environmental and Social Impact Study (ESIS) of the agricultural infrastructure construction project "Silos" in the municipality of Balombo, Benguela province.

The project proponent is the company Carrinho, SA, which submitted an application to the U.S. International Development Finance Corporation (DFC) for project financing through the African Development Bank (AfDB).

In preparing this study, the provisions established in Angolan legislation were considered, as well as the guidelines of the AfDB and DFC, duly mentioned and detailed in Chapter 3, which also presents the Institutional Framework of the main entities involved in the agricultural sector, as well as the Ministry of Environment.

At this stage of the Environmental and Social Impact Study, the aim is to identify the activities planned for the execution of the Project, analyze its possible impacts, and define the corresponding mitigation measures.

The municipality of Balombo covers 2,635 km² and has about 108,965 inhabitants. It borders Cassongue municipality to the north, Londuimbali to the east, Ucuma, Chinjenje, and Ganda to the south, and Bocoio to the west.

Administratively, the municipality consists of the central commune, corresponding to the city of Balombo, and the communes of Chindumbo, Chingongo, and Maca Mombolo.

Balombo stands out as a region with significant agricultural potential, especially in grain cultivation. Family farming predominates, focusing on crops such as maize, beans, massango, and massambala, which are fundamental for local food security. Agricultural promotion programs have been implemented to support family farmers, providing inputs and technical assistance, with the aim of increasing productivity and replacing imports with local production.

Balombo's arable land is characterized by fertile soils suitable for cultivating various crops, especially grains. The availability of water for irrigation is a crucial factor, and efforts have been made to improve access to water resources to ensure the sustainability of agricultural production.

The combination of fertile soils and support initiatives for farmers positions Balombo as a strategic area for agricultural development in Benguela province.

Taking advantage of the grain production potential of this municipality, the Carrinho group intends to build agricultural infrastructures “Silos,” with the objective of facilitating the storage and distribution of grains from various points in the municipality and other regions, not only to mitigate and reduce post-harvest losses but also to encourage farmers to increase production, contributing to food security and the region’s economic development.

The proposed project will be implemented in an area of 10,971 m². It will be built with reinforced concrete, mesh, metal structures, and sheets, etc.

The project consists of the construction of cereal storage silos with a storage capacity of 20,000 tons, intended for maize and wheat.

The silos with a storage capacity of 20,000 tons comprise:

- 1 road weighbridge with a capacity of 60 tons;
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Average annual temperatures range between 18 °C and 28 °C, with significant daily fluctuations. This climatic regime strongly influences local agricultural activity, requiring farmers to adapt crop cycles to water availability. The irregularity of rainfall in some years poses a challenge to sustainable production, especially in rainfed areas.

Balombo's soils are predominantly sedimentary in origin, with a strong presence of ferruginous and sandy soils, mixed with clay soils in valley areas. In general, they are moderately fertile soils, with some water retention capacity and reasonable depth, making them suitable for rainfed agriculture, mainly for crops adapted to local conditions such as maize, beans, massango, and cassava.

However, in many areas, soils present limitations related to acidity and low concentrations of organic matter and essential nutrients, requiring correction and fertilization practices to ensure good productivity. Erosion is also a concern, especially on deforested or poorly managed slopes, which can compromise long-term fertility. The combination of traditional farming practices, limited use of soil conservation technologies, and climate variability reinforces the need for sustainable soil use and management strategies to ensure continuous productivity.

The municipality is crossed by several small and medium-sized watercourses, the most important being the Balombo, Catapi, and Cubal rivers. These rivers are part of the local watersheds and are fundamental for supplying water to the population, agricultural irrigation, and livestock farming. Although their flow varies throughout the year, especially affected by the rainy and dry seasons, these watercourses constitute a vital source for the subsistence and rural development of the municipality.

The importance of Balombo's water resources is mainly associated with rain-fed agriculture, but they are also used in small irrigated areas, allowing the planting of vegetables and crop diversification. In addition, they play a relevant role in maintaining local ecosystems and domestic supply. However, there are challenges related to water collection, conservation, and efficient management, especially during drought periods, which reinforces the need for investments in sustainable water infrastructures, such as small retention systems, irrigation channels, and soil water conservation techniques.

The vegetation of Balombo municipality is predominantly savanna-type, with open forests, shrubs, and grasses, typical of transition regions between humid and dry tropical climates. The wetter areas near watercourses present denser vegetation, with small gallery patches and larger tree species such as baobab, acacias, and miombo.

This vegetation cover, although subject to human action such as extensive agriculture, burning, and deforestation for charcoal production, still plays an important role in soil conservation and ecological balance in the region. Vegetation also supports traditional farming practices, providing natural pasture and firewood for domestic use. Conserving local vegetation is essential to mitigate soil erosion and preserve water resources.

The main source of air pollution in the area is road traffic, although its effects are practically negligible given the low traffic volume and the constancy of winds that blow almost year-round.

The sound environment is also characterized by relative tranquility, with no significant noise disturbances.

From an ecological point of view, the implementation of the silos is not expected to cause significant impacts on local biodiversity, as the area is already strongly subject to anthropogenic changes. Clearing and stripping will be necessary, although restricted to the perimeter granted to Carrinho-Agri. The surrounding vegetation is constantly burned by local populations, thus reducing its diversity. No endangered or threatened fauna and flora species were observed in the project's immediate surroundings.

From a landscape perspective, the intervention area is framed within a semi-natural urban zone, characterized by human occupation coexisting with areas of sparse natural vegetation, affected by constant burning, impacting its visual quality.

The municipality of Balombo has about 108,965 inhabitants, of which 51,050 are male and 57,915 are female. Balombo presents a young and dynamic population, with more than half of residents of working age, and a youth population largely exceeding the elderly population.

The population of Bailundo has a low level of schooling, with a literacy rate of 43.4%.

The employment rate is 69.0%. Most of the population works in the primary sector (agriculture, animal production, hunting, forestry, and fishing) and the tertiary sector (commerce and services).

Within the scope of the ESIS work, the following entities were contacted: the provincial government of Benguela, the communal administration of Balombo (municipal directorate of environment and basic sanitation).

These entities expressed support for the project’s implementation, as it will have significant implications for the economic dynamism of the municipality.

The main negative environmental impacts of the project will occur during the construction phase and relate to noise and dust, due to the circulation of heavy and light vehicles, and the potential disturbance of the surrounding population. It is expected that with the implementation of mitigation measures and monitoring programs, the negative impacts during the construction phase will remain at low levels of significance.

At this stage, a positive impact is also noted in the stimulation of the local economy resulting from construction activity, creating jobs and boosting local commerce in restaurants and accommodation for an estimated period of 24 months.

In the project’s operational phase, negative impacts are associated with potential risk situations, although with low probability of occurrence if the proposed measures are adopted, namely accidental spills of polluting substances, noise, dust, and road accidents involving the population.

It is during the operational phase that all the project’s benefits will materialize, reflected in the improvement of the socioeconomic conditions of the population of Balombo and its surroundings. At this stage, it is expected that the population will be able to market grains at competitive prices and receive incentives to increase productivity and improve cultivation and storage techniques.

The main mitigation measures for negative impacts aim to ensure minimal effects in the intervened areas and reduce environmental and social impacts during the construction and operational phases. Generally, the following actions are highlighted:

Chart 4: Summary of mitigation measures (construction phase)

DESCRIPTION	IMPACT	MITIGATION MEASURES
Climate	Change in Evapotranspiration and Soil Level Temperature	Limit Excavations and Waterproofing to Strictly Necessary Areas
Geology and Geomorphology	Change in Local Geomorphology	Limit Excavations to Strictly Necessary Areas
Soils	Reduction of Water Infiltration Capacity	The circulation of machinery and other equipment involved in the work must be carried out strictly within the designated areas;
	Contamination by Spill	Keep equipment and machinery in good working condition; maintenance must be carried out in a safe and waterproofed location;
Surface Water Resources	Contamination of Watercourses by Accidental Spills and/or Runoff of Waste and Solid Sediments	Keep machines and vehicles in good working condition; do not carry out maintenance in non-waterproofed locations or in unsafe conditions;
Groundwater Resources	Aquifer Contamination by Accidental Spills and/or Waste Runoff	Keep machines and vehicles in good working condition; do not carry out maintenance in inappropriate locations;
<u>Flora</u>	Disturbance and Destruction of Native Flora	• Avoid degradation of existing vegetation cover by restricting vehicle circulation areas; • Conduct awareness campaigns for workers and communities on the importance of the designated zones and the species within the area, especially endemic and threatened species; • Carry out compensatory reforestation with native species (minimum 2:1) in nearby degraded areas
Flora	Disturbance and Destruction of Native Flora	• Installation of temporary vegetative barriers and signage to prevent species being run over; • Protection of sensitive areas and watercourses with sediment barriers; • Creation of a perimeter green belt with native trees

DESCRIPTOR	IMPACT	MITIGATION MEASURES
Fauna	Disturbance of Local Fauna	• Conduct awareness campaigns for workers and communities on the importance of preserving endemic or endangered species; • Reduce the speed of machinery and vehicle circulation in order to prevent the running over and death of species
Landscape	Landscape Alteration	• Support infrastructure, materials, and equipment must be established in properly designated areas in order avoid dispersion;
Air Quality	Air Quality Degradation (Emissions of Particles and Gases)	• Avoid the circulation of vehicles and machinery at high speed, complying with the established speed limits (60 km/h and 30 km/h) near and within localities; • Moisten areas where dust generation may occur;
Sound Environment	Increase in Noise Levels	• Avoid the circulation of vehicles at high speed, complying with the established limits (60 km/h and 30 km/h) near and within localities; • Carry out regular maintenance of equipment and machinery, and use them only when strictly necessary; • Establish working hours (e.g., 8:00 a.m. – 5:00 p.m.);
Socioeconomy	Job Creation	• The creation of new unskilled jobs should primarily benefit the populations living closest to the infrastructures; • All labor employed by the Central de Silos will comply with the provisions of international conventions on the protection of children's and workers' rights, to which Angola is a signatory through the International Labor Organization (ILO), as well as with the requirements of the African Development Bank's Integrated Safeguards System, specifically Operational Safeguard 5.

DESCRIPTOR	IMPACT	MITIGATION MEASURES
Socioeconomy	Boosting the Local Economy and Associated Sectors	• The materials to support this phase should preferably be acquired from the local market;
Infrastructure	Pressure on the Road Network and Urban Infrastructure (Water, Energy, and Sanitation)	• Comply with the established circulation speed limits (60 km/h and 30 km/h) near and within localities, and reduce circulation speed on unpaved roads; • Wastewater must be properly stored in appropriate containers in a safe area; • Awareness-raising and rational use of water and energy.
Waste	Environmental Contamination Risks	• The contractor will adopt a Waste Management Plan to ensure efficient management of the waste generated during construction and its temporary storage. A specific area will be created at the construction site for selective waste disposal, which will be covered and equipped with big-bags and metal or plastic containers properly identified according to the type of waste to be discarded; • The disposal of non-hazardous waste must be carried out by a duly licensed operating company; • All polluting substances used must be stored in appropriate locations, with restricted access and properly sealed, in order to reduce the risk of accidental spills. The contractor will adopt a Waste Management Plan based on the following guidelines.

Chart 5: Summary of mitigation measures (Operation Phase)

DESCRIPTION	IMPACT	MITIGATION MEASURES
Climate	Increase in the Perception of Heat Discomfort	• Promote the restoration of the intervened areas through the planting of gardens and trees adapted to the zone;
Geology and Geomorphology	Change in Local Geomorphology	• Take into consideration the micro-basin of the region, in order to effectively direct rainwater; • Avoid exposing areas that will not be used within a short period of time;
Soils	Reduction of Water Infiltration Capacity	• The circulation of machinery and other equipment involved in the works must be carried out strictly within the designated areas;
	Contamination by Spill	• Keep equipment and machinery in good working condition; maintenance must be carried out in a safe and sealed area; • Provide a spill response and emergency kit.
Surface Water Resources	Contamination of Watercourses by Accidental Spills and/or Runoff of Waste and Solid Sediments	• The maintenance of generators and other equipment must be carried out in a specific, sealed area with the necessary safety conditions; • Provide an emergency spill response kit.
Groundwater Resources	Aquifer Contamination by Accidental Spills and/or Waste Runoff	• Hazardous liquid waste and other products must be conditioned in appropriate containers and stored on spill containment basins; • Provide an emergency spill response kit.
Flora	Disturbance and Destruction of Native Flora	• Avoid degradation of the existing vegetation cover by restricting vehicle circulation areas; • Carry out awareness-raising activities for workers and communities on the importance of the created zones and the species within the area, especially endemic and threatened species; • Support local associations dedicated to research and preservation of flora; • Maintain and expand the green belt with species attractive to fauna; • Conduct semi-annual monitoring of flora and implement corrective actions.

DESCRIPTION	IMPACT	MITIGATION MEASURES
Fauna	Disturbance of local fauna	• Carry out awareness-raising activities for workers and communities on the importance of preserving endemic or endangered species; • Reduce the circulation speed of machinery and vehicles in order to avoid the running over and death of species; • Conduct semi-annual monitoring of fauna and implement corrective actions.
	Emergence of pests	• Develop a pest control plan; • Carry out periodic disinfestation of the facilities; • Install artificial nests and refuge boxes to attract natural pest predators.
Landscape	Landscape alteration	• Keep the facilities in good condition; • Do not use colors that contrast with the surrounding landscape; • Night lighting must be directed downward.
Air quality	Air quality degradation (emissions of particles, gases, and odors)	• Avoid the circulation of vehicles and machinery at high speed, complying with the established limits (60 km/h and 30 km/h) near and within localities; • Moisten areas where dust generation may occur; • Carry out regular maintenance of equipment and machinery, and use them only when strictly necessary. All waste must be properly stored in suitable containers to mitigate odor emissions.
Sound Environment	Increase in noise levels	• Avoid the circulation of vehicles at high speed, complying with the established limits (60 km/h and 30 km/h) near and within localities; Perform regular maintenance of equipment and machinery, and use them only when strictly necessary.

DESCRIPTION	IMPACT	MITIGATION MEASURES
Socioeconomics	Job creation	• The creation of new unskilled jobs should primarily benefit the populations living closest to the infrastructures; • All labor employed by the Central de Silos will comply with the provisions of international conventions on the protection of children's and workers' rights, to which Angola is a signatory through the International Labor Organization (ILO), as well as with the requirements of the African Development Bank's Integrated Safeguards System, specifically Operational Safeguard 5.
Socioeconomics	Boosting the local economy and associated sectors	• Provide technical support and knowledge of good agricultural practices to disadvantaged populations, in order to achieve higher yields and strengthen crops, thus contributing to poverty reduction; • Establish fair and competitive prices in the purchase of grains, encouraging increased production by individual farmers and existing cooperatives.
Infrastructure	Pressure on the road network and urban infrastructures (water, energy, and sanitation)	• Comply with the established circulation speed limits (60 km/h and 30 km/h) near and within localities, and reduce speed on unpaved roads; • Carry out the transport of goods at pre-established times, avoiding congested routes whenever possible; • Wastewater must be properly stored in appropriate containers in a safe area; • Monitor water and energy consumption, as well as waste production, and establish a plan to reduce them.
Waste	Environmental contamination risks	• Develop and implement a waste management plan; • Install equipment (eco-points) to facilitate segregation and reuse of waste in accordance with the Waste Management Plan (WMP), and encourage practices aimed at reducing waste generation; • The disposal of non-hazardous waste must be carried out by a duly licensed operating company; • All polluting substances used must be stored in appropriate locations, with restricted access and properly sealed, in order to reduce the risk of accidental spills.

Implementation of the Environmental and Social Management Plan (ESMP)

The implementation of the Environmental and Social Management Plan (ESMP) is a crucial step to ensure that the construction and operation activities of the grain storage silos are carried out in an environmentally responsible and socially sustainable manner. This plan defines the preventive, mitigating, and corrective measures to be applied in order to minimize negative impacts and enhance the benefits for local communities and the environment.

The ESMP includes actions related to waste management, control of atmospheric emissions and noise, preservation of water and soil quality, promotion of occupational health and safety, and mechanisms for communication and community engagement. Its implementation will be supported by a continuous monitoring system and periodic reporting, ensuring compliance with Angolan legislation and applicable international standards, as well as transparency before all relevant stakeholders.

Some key implementation indicators of the ESMP that may be monitored during the construction and operation phases of the grain silo projects include:

- **Air quality:** levels of particulate matter (PM_{10}, $PM_{2.5}$) and equipment emissions.
- **Environmental noise:** sound pressure levels near sensitive areas.
- **Water quality:** physicochemical and microbiological parameters.
- **Waste management:** quantities generated, segregation, and final destination.
- **Resource use efficiency:** volume of water and energy consumed.
- **Occupational health and safety conditions:** number of accidents and incidents recorded.
- **State of vegetation and soil:** impacted areas and recovery actions implemented.
- **Compliance with mitigation measures:** percentage of ESMP measures effectively implemented.
- **Community engagement:** number of consultations, complaints, and resolutions conducted.
- **Training and capacity building:** number of workers trained in environmental and safety practices, among others.

The presentation of costs associated with the implementation of the monitoring programs proposed in this Environmental and Social Impact Assessment (ESIA) is structured into two phases: **Construction Phase** and **Operation Phase**.

Chart 6: Implementation Costs of the Programs

Programs	Cost Estimate (Annual)	
	Construction Phase	Operation Phase
Monitoring Plan for Effluents Stored in Septic Tanks	3,500 USD	8,200 USD
Occupational Health and Safety Plan for Workers	8,000 USD	10,000 USD
Atmospheric Emissions and Air Quality Monitoring Program	12,000 USD	15,000 USD
Noise Level Monitoring Program	4,500 USD	6,000 USD
Environmental Education Program	12,000 USD	18,000 USD
Biodiversity Monitoring Program	7,500 USD	9,000 USD
Emergency Plan	8,000 USD	16,000 USD
Waste Management and Monitoring Program	4,500 USD	8,000 USD
Pest Control and Management Plan		12,000 USD
Stakeholder Communication and Engagement Program	18,000 USD	22,000 USD
Mechanism for Submitting Environmental and Social Impact Assessment (ESIA) Monitoring Reports	10,000 USD	12,000 USD
Environmental and Social Performance Audits		20,000 USD
Total	**88,000 USD**	**156,200 USD**

Financial responsibilities related to the implementation of the monitoring programs during the construction phase will be assumed by the **contractor**, while the costs associated with the implementation of the monitoring programs during the operation phase will fall under the responsibility of **Carrinho, S.A.**

The conclusions of the Environmental and Social Impact Assessment (ESIA) indicate that the project is considered environmentally viable, provided that the proposed mitigation measures are effectively implemented.

It is also noted that the Province of Benguela possesses, at the institutional level, all the necessary capacities to successfully carry out the project proposed by the Carrinho Group, S.A. Nevertheless, Carrinho S.A. will need to strengthen its environmental and social capacities through the hiring of a qualified specialist to manage environmental and social matters in accordance with the requirements established by the financing institution.

Summary of Public Consultation and Participation

Public Consultation is a mandatory stage in the Environmental Impact Assessment (EIA) process, as established by the Environmental Framework Law (Law No. 5/98 of June 19), Presidential Decree No. 117/20 of April 22, and Executive Decree No. 87/12 of February 24, which regulate public participation in environmental matters. This procedure aims to ensure transparency, inclusiveness, and the participation of communities, local authorities, and other stakeholders in the analysis of projects with potential environmental and social impacts. This requirement is also reinforced by the African Development Bank (AfDB) through its Operational Safeguard No. 1, which mandates free, prior, and informed consultations.

As part of the Agricultural Infrastructure Construction Project “Silos” in Benguela Province, a public consultation session was held on June 13, 2025, with nine (9) representatives from the local administrations of Lobito, Ganda, and Balombo municipalities. The session covered the presentation of the project, the main environmental and social impacts, the proposed mitigation measures, and collected contributions, comments, and recommendations from participants.

During the public hearing session of the Agricultural Infrastructure Project Grain Silos, representatives from the municipal administrations and provincial departments expressed their support and provided constructive feedback. The Municipal Administration of Balombo highlighted its previous experience with Carrinho Agri and the availability of land for infrastructure, committing to provide full support for the project. The Municipal Administration of

Lobito emphasized its strategic advantage as a port city and the expected positive impact on local communities. The Administrator of Ganda noted the increase in grain storage capacity from 8,000 to 28,000 tons as a significant improvement. The Provincial Office for Integrated Economic Development reinforced the project's alignment with the goal of food self-sufficiency and the importance of proper processing and storage to ensure grain quality and food security. The Provincial Office for Environment, Waste Management, and Community Services stressed the importance of community consultation and noted that the project does not present significant environmental impacts. Finally, the Provincial Office of Agriculture, Livestock, and Fisheries expressed great optimism and assured full sectoral support for the project's implementation.

In response, the project coordination team confirmed that all recommendations will be adopted, ensuring the formalization of designated areas, institutional integration, continuous dialogue, prioritization of strategic municipalities, implementation of a Grievance Mechanism, and ongoing information sharing to support public policy and maximize the project's socioeconomic benefits.

Dialogue and Complaints Record

Following the presentation of the project held on June 13, 2025, with the entities of the Municipal Administration of Benguela, it was agreed that the information would subsequently be shared with the local community. Accordingly, on February 20, 2026, at 9:00 a.m., a public consultation meeting was held in the municipality of Balombo, at the Union Hall of the Municipal Directorate of Education, under the chairmanship of the Secretary-General of the Municipal Administration, Dr. João Tcombela Jaka, representing the Municipal Administrator.

The meeting was attended by members of the Municipal Executive, namely advisors and directors from different departments, as well as representatives of Grupo Carrinho, traditional authorities, members of the Community Consultation Council, and representatives of civil society. During the session, Eng. Edmar Martins, representing Grupo Carrinho, presented the Agricultural Infrastructure Project, which foresees the construction of silos and warehouses for the handling and storage of cereals within the municipality.

In his address, the representative highlighted the project framework and its potential socioeconomic impact, emphasizing that the initiative aims to boost the local agricultural sector, increase the production of cereals and oilseeds, improve market efficiency, and strengthen the supply of goods to communities. The main environmental and social instruments were also presented, along with the expected risks and impacts.

Community members unanimously expressed their support for the implementation of the project, recognizing the agricultural potential of the municipality. The session concluded with words of encouragement from the Secretary-General, who underscored the strategic importance of the project for national productivity and local job creation.

A total of 54 individuals were present, of whom 38 were male and 6 female.

2 INTRODUCTION

2.1 GENERAL INFORMATION

Agriculture plays a crucial role in the global economy, especially in a context of population growth and increased demand for food. Agricultural infrastructure is an essential component for successful grain production, and proper storage is one of the most critical steps in the production chain. Silos, as structures dedicated to grain storage, play a key role in preserving product quality, managing inventories, and maximizing farmer profitability.

In this scenario, grain storage infrastructure becomes vital to ensure food quality and safety. Silos, in their various forms and technologies, offer effective solutions to protect grains from adversities and pests, allowing for greater production and profitability. The modernization of storage facilities not only improves efficiency but also promotes sustainability in the sector.

As part of the expansion and diversification of its activities, this group intends to extend its silo deployment bases to various parts of the country for the storage of grain produced in the regions where these infrastructures will be built, in order to facilitate its internal distribution and export, as well as to extend its shelf life and quality.

To this end, silos for grain storage will be built in the municipality of Balombo, Benguela province. Silos are infrastructures for protecting and storing grain, minimizing post-harvest losses and ensuring product quality. In addition, with the advent of innovative technologies, silos have become more efficient, offering sustainable solutions that benefit both farmers and producers as well as the environment.

This document constitutes a technical report on the Environmental and Social Impact Assessment (ESIA) of the Balombo Grain Storage Silos Agricultural Infrastructure Construction Project, owned by Grupo Carrinho, SA. This Environmental and Social Impact Assessment was prepared in accordance with Article 4 of Presidential Decree 117-20 - Regulation on Environmental Impact Assessment and Environmental Licensing Procedure, which regulates environmental protection in the course of infrastructure activities and requires the preparation of an Environmental Impact Assessment, as well as guidelines for the project proponent.

The EIAS is a fundamental component of the environmental impact assessment process, which aims to identify and assess the main environmental impacts, analyze mitigation alternatives, including the environmental and social feasibility of the Project, supporting the decision-making of the Ministry of the Environment (MINAMB) with a view to the environmental licensing of the Project.

The Agricultural Infrastructure Construction Project for Grain Storage "Silos" to be developed, which includes the construction of food storage facilities. According to Annex I of Presidential Decree No. 117/20 of April 22, the project falls under category **B.**

Projects classified as Category B are those that may cause moderate to significant environmental and social impacts, but which can be controlled and minimized through the implementation of mitigation measures. These projects require a Simplified Environmental Impact Assessment (SEIA) or an Environmental and Social Management Plan (ESMP), but do not require a full Environmental Impact Assessment (EIA), as in Category A.

Main Characteristics of Category B Projects:

- Localized environmental impacts – Environmental effects are moderate and restricted to the project area, with less risk of severe degradation;
- Mitigation measures required – Impacts can be reduced with good environmental practices and management plans;
- Require a Simplified Environmental Impact Assessment (SEIA) – A technical report must be prepared, containing a description of the project, possible impacts, and mitigation measures.

Examples of Category B Projects:

- Small and medium-sized industrial units;
- Medium-sized agricultural and livestock infrastructure;
- Small-scale natural resource exploitation projects;

- Small power plants or substations;
- Construction of secondary and tertiary roads;
- Silos and grain storage facilities.

2.2 IDENTIFICATION OF THE PROJECT PROPOSER

Table 7: Identification of the proponent

COMPANY IDENTIFICATION	
Company name	CARRINHO INDÚSTRIA (SU), LDA
Full address	Rua de São Tomé s/n -Lobito/Benguela
Phone	+244 934719989
COMPANY REPRESENTATIVE	
Name	Décio Catarro
Position	CEO-Carrinho Indústria
Phone	+244 XXXXXXX
Email	Decio.catarro@carrinho-sa.com
PERSON CONTACT PERSON	
Name	Adriano Condumulã
Position	Licensing Technician
Phone	(+244) 923383335
Email	Adriano.condumula@carrinho-sa
REGISTRATION	
Commercial Registration Number	0002.240111
Tax Identification Number (NIF)	5000202665

2.3 IDENTIFICATION OF THE COMPANY RESPONSIBLE FOR PREPARING THE EIAS

Table 8: Identification of the company responsible for the EIAS

COMPANY IDENTIFICATION	
Company Name	HSG - CONSTRUÇÃO, ENGENHARIA E COMÉRCIO, LDA
MINAMB Registration No.	8320352235
Address	Rua Nossa Senhora de Fátima, nº2-BC-105, Luanda/Angola
Tax ID	5417007978
COMPANY REPRESENTATIVES	
Name	Herineu Gomes
Position	General Manager
Phone	(+244) 923439634
Email	Euclideskid1@hotmail.com

2.4 TECHNICAL TEAM RESPONSIBLE FOR THE EIAS

This Environmental and Social Impact Assessment (ESIA) was prepared in September 2024 by technicians and consultants from HSG - CONSTRUÇÃO, ENGENHARIA E COMÉRCIO, LDA, as detailed in the table below.

Table 9: Technical team responsible for preparing the EIAS

Technician	Qualifications	Position	Signature
Renato Feliz Sirdes	✓ Master's Degree in Management and Governance Environmental	Coordinator	
Bruno Constantino	✓ Master's Degree in Engineering of and Environment	Technician	
Albertina J. A. Pascoal	✓ Bachelor's Degree in Environmental	Technician	
Nelson Morais	✓ Geologist	Technician	
Camilo Rebocho Váz dos Santos	✓ Degree in Architecture and Urban Planning.	Technician	
Belarmino Pascoal	✓ Degree in Biology	Technician	
Verônica Pacheco	✓ Bachelor's Degree in Environmental Engineering Environmental	Technician	

3 LEGAL FRAMEWORK

This chapter establishes the legal framework for the project with regard to Angolan government legislation on environmental and social impacts. The legal framework of the project is also aligned with the environmental and social safeguard policies established by the African Development Bank (AfDB), as well as international standards and policies for the protection of the environment, occupational health and safety of workers and the local community.

3.1 National legal framework

<u>**Constitution of the Republic of Angola 2010**</u>

Article 39 of the Constitution of the Republic of Angola enshrines the right to the environment and declares the right of citizens to live in a healthy and unpolluted environment, as well as the duty to defend and preserve it. The same article requires the State to adopt the necessary measures to protect the environment and species of flora and fauna throughout the national territory, maintain ecological balance, ensure the correct location of economic activities, and promote the rational exploitation and use of all natural resources, within the framework of sustainable development and respect for the rights of future generations and the preservation of different species. It thus punishes acts that endanger or harm the preservation of the environment.

Therefore, according to the nature of the project under review, the table of applicable legislation is provided below.

Table 10: National legislative framework

Legal framework	Publication
General	
Basic Environment Law	Law No. 5/98, of June 19
Law on Environmental Protection Associations	Executive Decree No. 3/06, dated January 18
Environmental Impact Assessment	
Environmental audits of public or private activities	Executive Decree No. 1/10, of January 13
Incompatibility of consulting companies registered with the Ministry of the Environment that carry out supervisory activities and cumulative auditing and environmental impact study activities	Order No. 680/11, of October 10

Legal Framework	Publication
Regulation on the Technical Registration of Environmental Consulting Companies	Executive Decree No. 86/12, of February 23
Legal Framework	**Publication**
Regulations on Liability for Environmental Damage	Executive Decree No. 194/11, of June 7
Regulation on Public Consultations for projects subject to Environmental Impact Assessment	Executive Decree No. 87/12, of February 24
Cancels environmental consulting activities in Environmental Impact Assessment carried out by individual environmental consultants	Executive Decree No. 85/12, of May 27
Assessment committee for each Environmental Impact Study for Environmental Licensing, coordinated by the National Director of Environmental Impact Assessment and Prevention Environmental Impacts	Order No. 2745/13, of December 6
Data to be submitted with Environmental Impact Studies for Environmental Licensing	Order No. 2746/13, of December 6
Environmental Monitoring and Industrial Audit Support Unit	Order No. 72/15, dated February 13
Commission of Evaluation of Curricula of Environmental Consultants and Calculation of the Amount Payable for Environmental Licensing	Decree No. 34/15, of October 23
Environmental Impact Assessment Unit - Repeals Order No. 87/15, of March 6	Order No. 405/15, of December 1
Classification of Environmental Consulting and Auditing Companies	Executive Decree No. 302/16, of June 30
Regulation of Environmental Environmental for Certification	Executive Decree No. 249/17, of April 25
Amends the deadline for MINAMB to submit an opinion to the project licensing entity - Repeals Executive Decree No. 241/16, of May 25	Executive Decree No. 119/19, of May 20
Approves the amendment to the wording of Article 31(1), Article 36, Article 37(3), and Article 39(1) 39 of Presidential Legislative Decree No. 8/19, of June 19, which approves the Organization and Functioning of the Auxiliary Bodies of the President of the Republic	Presidential Legislative Decree No. 4/20, of April 1

Legal framework	Publication
Approves the table of fees to be charged for the issuance and renewal of Environmental Licenses for Environmental Impact Assessment, as well as the registration and renewal of environmental consulting companies.	Presidential Decree No. 83/22, of April 22
General Regulations on Environmental Impact Assessment and the Environmental Licensing Procedure	Presidential Decree No. 117/20, of April 22
Waste	
Registration of companies operating in the areas of waste, water treatment, and wastewater	Order No. 199/12, of February 29
Regulation on Waste Management	Presidential Decree No. 190/12, of August 24
Management of Construction and Demolition Waste	Executive Decree No. 17/13, of January 22
Guidelines for the Preparation of Provincial Urban Waste Management Plans	Executive Decree No. 234/13, of July 18
PESGRU - Strategic Plan for Urban Waste Management	Presidential Decree No. 196/13, dated August 30
Water and Basic Sanitation	
Law on Sanitary Regulations	Law No. 5/87, of February 23
Water Law	Law No. 6/02, of June 21
Water Sector Development Strategy	Council of Ministers Resolution No. 10/04, of June 11
Water for All Program	Council of Ministers Resolution No. 58/07, of July 30
Regulation on Water Quality	Presidential Decree No. 261/11, of October 6
Regulations for the Prevention and Control of Pollution of National Waters	Executive Decree No. 141/12, of June 21
Regulations for the General Use of Water Resources	Presidential Decree No. 82/14, dated April 21
Regulations for Public Water Supply and Wastewater Sanitation	Presidential Decree No. 83/14, of April 22
National Water Plan	Presidential Decree No. 126/17, of June 13
National Strategic Water Plan (2018-2022)	Presidential Decree No. 158/18, of June 29
General Plan for the Integrated Use of Water Resources in the Cubango River Basin (PGUIRH)	Presidential Decree No. 27/16, of January 26
Legal regime governing water abstraction charges.	Presidential Decree No. 41/21 of February 12
Regulation of Tariffs for Water Supply and Wastewater Services	Presidential Decree No. 255/20, of October 7
Regulation on the Registration and Licensing of Companies Operating in the Areas of Waste, Water Treatment, and Wastewater	Executive Decree No. 24/15, of January 29
Regulation on Transfer of Waste for Reuse, Recycling, and Recovery	Presidential Decree No. 265/18, of November 15
Legal Framework for Landfills	Presidential Decree No. 203/19, of June 25

Legal framework	Publication
Flora and Terrestrial Flora	
Basic Law on Forests and Wildlife	Law No. 6/17, of October 24
Regulations for the protection of flora resources and plant species, including forest resources.	Decree No. 40.040 / 1955, of January 20
Convention on the Conservation of Nature and Natural Resources in Africa - Maputo Convention	Resolution No. 5/14 (National Assembly) of January 20
Prohibits the killing of protected species of wild fauna and flora in national territory	Executive Decree No. 469/15, of July 13
Red List of Species of Angola	Executive Decree No. 252/18, of July 13
Forestry Regulation	Presidential Decree No. 171/18, of July 23
Protected Areas	
Regulation of National Parks	Ordinance No. 10,375/1958, of October 15
Environmental Conservation Areas Law	Law No. 8/20, of April 14
Resettlement	
Rules on the resettlement of displaced populations.	Decree No. 1/01, dated January 5
Regulation on Relocation Operations	Presidential Decree No. 117/16, of May 30
Hygiene, Health, and Safety at Work	
Principles for promoting safety, hygiene, and health at work	Decree No. 31/94, of August 5
Obligation to organize SHST services in companies.	Executive Decree No. 6/96, of February 2
Rules governing the Commissions for the Prevention Workplace Accidents, hereinafter referred to as "CPAT"	Executive Decree No. 21/98, of April 30
Regulations on HIV/AIDS. Employment and Vocational Training	Decree No. 43/03, of July 4
Regulations on Safety, Hygiene, and Health at Work.	Executive Decree No. 128/04, of November 23
The Angolan State is a member of the World Health Organization (WHO), an institution under the auspices of the International Health Regulations (2005).	Resolution 32/08, of September 1
Legal Framework for Occupational Accidents and Diseases	Decree No. 53/05, of August 15
Regulation on the legal framework for fire safety in buildings.	Presidential Decree No. 195/11, of July 8
Regulations on Licensing for the Provision of Occupational Safety, Hygiene, and Health Services	Presidential Decree No. 179/24, of August 1
Regulation on Safety Accessories, Special Warning Devices, Use of Fire Extinguishers, First Aid Equipment, and Light Signals for Bicycles	Presidential Decree No. 145/17 of June 26
General Labor Law	Law No. 12/23 of December 27

Land Use Planning	
Land Law	Law No. 3/04, of June 25
Political-Administrative Division Law	Law No. 14/24, of September 5
Law on Land Use Planning and Urban Development (LOTU)	Law No. 9/04, of November 9
Basic Law on the Administrative Organization of the Territory	Law No. 13/16, of September 12
State Local Administration Law	Law No. 15/16, of September 12
Regulation on the Coastal Zone Management Plan	Decree No. 4/01, of February 2
General Regulations on Territorial, Urban, and Rural Plans (REPTUR)	Decree No. 2/06, of January 23
Cultural Heritage	
Cultural Heritage Law	Law No. 14/05, of October 7
Gender	Executive Decree No. 222/13, of December 24
National Policy for Gender Equality and Equity	Executive Decree No. 222/13, of December 24
Natural Disasters	
National Plan for Preparedness, Contingency, Response, and Recovery from Calamities and Natural Disasters, for the period 2015/2017	Executive Decree No. 29/16, of January 1
Strategic Plan for Disaster Risk Prevention and Reduction, within the scope of the 2013/2017 National Development Plan	Executive Decree No. 30/16, of January 3

3.2 International Protocols and Agreements

In the absence of national legislation governing air quality issues, an analysis was conducted of the conventions and international protocols ratified by Angola in this area.

Table 11: International Legal Framework

Convention on the Elimination of All Forms of Discrimination Against Women – CEDAW (1981)	Resolution AN 15/84, of September 19
Convention on the Law of the Sea	Resolution No. 17/90, of October 6
Convention on the Rights of the Child	Resolution AN 20/90, of November 10
African Charter on Human and Peoples' Rights	Resolution AN 1/91, of January 19
International Covenant on Civil and Political Rights	NA Resolution 26-B/9/91, of December 27
International Covenant on Economic, Social and Cultural Rights (1966)	AN Resolution 26-B/9/91, of December 27
African Charter on the Rights and Welfare of the Child	Resolution AN 1-B/92, of May 15
Convention on the Protection of the Underwater Cultural Heritage (UNESCO)	Adopted in 1995
Convention on Biological Diversity, 1992	Resolution No. 23/97, of July 4
Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol	Resolution No. 12/98, of April 20
Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO)	Ratified on November 7, 1991
Convention to Combat Desertification	Resolution No. 12/00, of May 5

International Legal Framework	
Convention for the Safeguarding of the Intangible Cultural Heritage (UNESCO)	Approved in 2003
Convention on Migratory Species of Wild Animals (Bonn Convention)	Resolution No. 14/03, of April 15
IUCN – International Union for Conservation of Nature	Resolution No. 21/03, of May 27
Convention on the Protection and Promotion of the Diversity of Cultural Expressions (UNESCO)	Ratified on February 7, 2005
Stockholm Convention on Persistent Organic Pollutants	Resolution No. 49/05, of October 30
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	Resolution No. 1/07, of February 14
United Nations Framework Convention on Climate Change, 1997	Resolution No. 14/07, of March 28
Convention on the Rights of Persons with Disabilities	Resolution AN 1/13, of June 11, 2007
Optional Protocol to the Convention on the Rights of Persons with Disabilities	Resolution AN 1/13, of June 11, 2007
Optional Protocol to the Convention on the Elimination of All Forms of Discrimination Against Women	Resolution AN 23/07, of June 23
Inquiry into the implementation of CEDAW	Resolution AN 23/07, of June 23
Benguela Current Convention	Resolution No. 15/15, of July 3
Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa	Resolution AN 25/07, of July 16
Convention on Wetlands of International Importance	Resolution No. 27/16, of July 22
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	Resolution No. 29/16, of July 25
Convention on Cooperation for the Protection and Development of the Coastal Environment of the West and Central African Region	Resolution No. 32/16, of July 29
Paris Agreement on climate change	Resolution No. 37/20, of October 12
Cartagena Protocol on Biosafety	Approved on January 29, 2000
Rotterdam Convention on Chemicals and Pesticides	Adopted on September 10, 1998, and entered into force on February 24, 2004.

3.3 African Development Bank Integrated Safeguards System

The Integrated Safeguards Framework is part of the African Development Bank's (AfDB) strategy to promote socially inclusive and environmentally sustainable growth.

Safeguards are a powerful tool for identifying risks, reducing development costs, and improving the sustainability of projects, benefiting affected communities and helping to preserve the environment.

With this Integrated Safeguards System, the AfDB is better equipped to address emerging environmental and social development challenges. The Integrated Safeguards System not only promotes best practices in these areas, but also encourages greater transparency and accountability.

The Integrated Safeguards System is designed to protect populations affected by World Bank-financed operations, especially the most vulnerable communities, by providing, for example, project-level grievance and compensation mechanisms, i.e., allowing the concerns of affected populations to be heard and addressed in a structured, systematic, and managed manner during the planning and implementation phases of the project.

The AfDB, in accordance with its mandate set out in Article 1 of the Bank Agreement and Article 2 of the Fund Agreement, and the provisions of Article 38 of the Bank Agreement and Article
21 of the Fund Agreement, considers economic and social rights to be an integral part of human rights and, consequently, affirms that it respects the principles and values of human rights as defined in the Charter of the United Nations and the African Charter on Human and Peoples' Rights. These were some of the principles that guided the development of the Integrated Safeguards System. The AfDB encourages member countries to observe international human rights norms, standards, and best practices, based on their commitments under the International Covenants on Human Rights and the African Charter on Human and Peoples' Rights.

Consideration of these values and principles places the AfDB at the forefront of multilateral development banks, with a set of clear and integrated policies and procedures for addressing safeguarding issues that arise in the course of development. With the Integrated Safeguards System, the AfDB is empowered to fulfill its mandate and help increase the effectiveness and development impact of its operations.

The Integrated Safeguards System is thus one of the most robust tools available to the AfDB to help promote the well-being of those it serves, i.e., the people of Africa.

In general, the safeguards aim to:

- Avoid adverse impacts of projects on the environment and affected people, while maximizing development benefits;
- Minimize, mitigate, and/or compensate for adverse impacts on the environment and affected people when such impacts cannot be avoided; and
- Help borrowers/clients strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

The AfDB requires borrowers/clients to comply with these safeguard requirements during project preparation and implementation. The Integrated Safeguards Policy Statement sets out the basic principles that guide and underpin the AfDB's approach to environmental safeguards.

In addition, the AfDB has adopted five operational frameworks, limiting their number to what it considers necessary to achieve the goals and optimal functioning of the Integrated Safeguards System, namely:
Integrated Safeguards System, namely:

Operational Safeguard 1: ***Environmental and Social Assessment*** - This comprehensive safeguard governs the process of determining a project's environmental and social category and the applicable environmental and social assessment requirements: scope; category; implementation of a strategic environmental assessment or an environmental and social impact assessment, where appropriate; Environmental and Social Management Plans; assessment of vulnerabilities to climate change; public consultation; impacts on the community; assessment and treatment of vulnerable groups; and grievance procedures. The Safeguard updates and consolidates the commitments set out in the AfDB's environmental policy.

Operational Safeguard 2: Acquisition of land for involuntary resettlement, displacement of populations, and compensation - This safeguard consolidates the commitments and requirements set out in the AfDB's policy on involuntary resettlement and incorporates a number of refinements designed to improve the operational effectiveness of these requirements. In particular, it comprises comprehensive and forward-looking notions of livelihoods and assets, addressing social, cultural, and economic dimensions. It also adopts a definition of community and common property that emphasizes the need to maintain social cohesion, community structures, and social interconnections that common property provides. This safeguard ensures the requirement for compensation, covering full replacement; reiterates the importance of resettlement that improves living standards, income-earning capacity, and livelihoods in general; and emphasizes the need to ensure that social considerations such as gender, age, and participation in project outcomes do not particularly disadvantage those affected by the project.

Operational Safeguard 3: Biodiversity and Ecosystem Services – This safeguard aims to conserve biological diversity and promote the sustainable use of natural resources. It also translates the AfDB's commitments in its integrated water resources management policy and the United Nations Convention on Biological Diversity into OS requirements. This safeguard reflects the importance of biodiversity on the African continent and the value of key ecosystems to the population, emphasizing the need to *"respect, conserve, and maintain the knowledge, innovations, and practices of indigenous and local communities (...) and to protect and encourage the customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements*."

Operational Safeguard 4: Pollution prevention and control, hazardous substances, and resource efficiency - This safeguard covers the range of key impacts of pollution, waste, and hazardous substances for which there are agreed international conventions, as well as specific industry and regional standards, including greenhouse gas accounting of greenhouse gases, which other multilateral development banks adopt. This safeguard also introduces vulnerability analysis and monitoring of greenhouse gas emission levels and provides a detailed analysis of possible reduction or a framework for compensatory measures.

Operational Safeguard 5: Labor, Health, and Safety – This safeguard establishes the AfDB's requirements for its borrowers or clients regarding workers' conditions, rights, and protection against abuse or exploitation. It thus covers working conditions, workers' organizations, occupational health and safety, and the prevention of child or forced labor. It also ensures greater harmonization with most other multilateral development banks.

3.4 Alignment and Complementarity between Angolan Legislation and AfDB and DFC Requirements

Table 12: Alignment and Complementarity between Angolan Legislation and AfDB and DFC Requirements

Item	Angolan Legislation	Integrated Security System (ISS of the AfDB)	Alignment and Complementarity
Environmental and Social Impact Assessment	The Annex to Presidential Decree No. 117/20 of April 22 presents the categorization of activities (A, B, C, D, E) and a list of those of those that require environmental studies. Article 4 of this legal document refers to "licensing of agricultural, forestry, industrial, commercial, housing, tourism, or infrastructure projects which, due to their nature, size, or location, have implications for environmental and social balance and harmony, are subject to a prior Environmental Impact Assessment process, which involves the preparation of an Environmental Impact Assessment (EIA) to be submitted for approval by the competent authority responsible for the environment." The legislation establishes the minimum content for the EIA and Terms of Reference for certain types of projects. For the water sector, this only applies to water supply systems (Decree No. 92/12 of March 1). The issuance of the Environmental Installation License for projects subject to EIA is conditional upon the approval of the EIA.	**PO1** - Integrated Environmental and Social Assessment Operational Safeguard 1 establishes different categories of projects in relation to environmental and social impact assessment, highlighting in more detail projects with significant and/or irreversible adverse impacts, or those significantly affect environmental and social components considered sensitive. It defines the content of the EIAS and establishes specific guidelines for the agriculture sector and associated infrastructure (silos), etc.	Both require prior impact assessment. The AfDB and DFC expand on this with analysis of alternatives and more robust plans. Angolan legislation establishes categories of activity and defines the EIA requirements for projects with and less significant and reversible. Angolan legislation includes agricultural infrastructure (silos) in the list of activities subject to EIA, categorized as Category B projects, referred to in 38 - other projects. According to the AfDB, agricultural infrastructure projects, if not large in scale, are classified as Category 2 and only require the preparation of an Environmental Management Plan. The DFC shares the same view, and projects of this nature fall under Category B .

Item	Angolan Legislation	Integrated Security System (ISS of the AfDB)	Alignment and Complementarity
Environmental and Social Impact Management	The Environmental License is conditional upon the submission of an Environmental Management Plan to be presented with the Environmental Impact Study of compliance (Presidential Decree No. 117/20, of April 1). The Environmental Installation License provides for environmental auditing during the operational phase (Decree No. 1/10, of January 13).	**PO1** - Integrated Environmental and Social Assessment The PGAS is a management tool and is carried out during the construction and operation phases, including, among other things, the definition of responsibilities, measures to be implemented, implementation schedule, and budget.	Both provide for informed participation. The AfDB and DFC require formal documentation and complaint mechanisms.
Public Consultations	As part of the EIA process, a public consultation lasting 5 to 10 days is planned, through a meeting conducted by MINAMB (Executive Decree No. 87/12, of February 24). The public consultation report is based on a public hearing.	**PO1** - Stakeholder Engagement Operational Safeguard 1 establishes the need to hold public consultations from the beginning of the project cycle.	Angolan legislation defines public consultation in a more limited way, without specifying the need for public consultations throughout the project cycle and not limited to the public presentation meeting to discuss the EIA.
Biodiversity	The Basic Environment Law (Environment, Law No. 5/98, of June 19) includes the protection of biodiversity within its scope, and the Aquatic Biological Resources Law (Law No. 6-A/04, of October 8) establishes the principles of rules for the protection of biological and aquatic resources. Angola has acceded to the Convention on Biological Diversity (Resolution No. 23/97, of July 4) and the International Convention on RAMSAR sites, which protects these wetland and coastal ecosystems (Resolution No. 27/16, of July 22).	**PO3** - Conservation of biodiversity Establishes the need to adopt a mitigation hierarchy to avoid impacts on ecosystem integrity and biodiversity conservation.	Both advocate protection. BAD and DFC require mitigation in critical areas and compensation.

Item	Angolan legislation	Integrated Security System (ISS of the AfDB)	Alignment and Complementarity
Pollution Prevention	The Basic Environment Law includes the principle of pollution prevention. There are legal provisions relating to waste and water quality, but there are no regulations on atmospheric emission limits, noise, and vibrations.	**PO4** - Pollution prevention and resource efficiency The BAD and DFC adopt the parameters established by the World Bank.	Good match. The ADB and DFC require international standards and the use of the best technologies.
Resettlement	There are rules, regulations, procedures, and criteria for the resettlement of groups of people (Decree No. 1/01 of January 5 and Presidential Decree No. 117/16 of May 30).	**PO2** - Involuntary resettlement A Operational Safeguard 2 establishes the need to carry out of a Resettlement Resettlement Plan, with defined procedures defined, aimed at improving the living conditions of the affected populations.	Both require compensation. BAD reinforces with the restoration of livelihoods and ongoing consultation.
Occupational Health, Safety, and Hygiene	Angolan legislation regulates the Occupational Safety, Hygiene, and Health System and defines the principles aimed at preventing accidents at work, occupational diseases, and other risks inherent to the work environment (Decree No. 31/94, of August 5).	**PO5** - Working conditions, health, and safety Operational Safeguard 5 requires protection of workers against abuse or exploitation, and hygiene and safety at work.	Both guarantee safe conditions. ISS requires formal HSST plans and continuous supervision.

No discrepancies were identified between Angolan legislation and the Safeguard Guidelines of the African Development Bank (ADB) and **the U.S. International Development Finance Corporation (DFC)**. The distinctions noted in the table above refer to cases where Angolan regulations are more or less restrictive than the guidelines of the African Development Bank and DFC, or to circumstances where national legislation does not set specific limits for certain emissions. In this study, we have chosen to adopt the highest requirement, ensuring compliance with all requirements established by both the Angolan legal framework and the guidelines of the multilateral financial institution.

3.5 Environmental and Social Standards

As a result of the comparative analysis carried out between Angolan legislation and the African Development Bank and DFC Safeguard Guidelines, where some discrepancies were identified, this section aims to set out the Environmental and Social Standards applicable to the Project. These standards are intended to complement Angolan regulations or, in the absence of specific national legislation, serve as a reference for the adoption of widely recognized international standards, such as those of the World Bank and the World Health Organization (WHO), in addition to best environmental and social practices.

Finally, it was necessary to include in this section the guidelines relating to Public Consultation, detailing the applicable regulatory procedures. This is due to the differences between Angolan legislation and the Safeguard Policies of the AfDB and DFC, thus ensuring that the Project complies with the guidelines established by the African Development Bank and the DFC.

3.6 Institutional Framework of Stakeholders and Parties Involved in the Environmental and Social Areas

The implementation of projects with environmental and social impact requires coordinated coordination between different government, municipal, and community entities. Within the scope of this project, the institutional framework integrates the bodies and structures responsible for environmental, social, agricultural, and economic management, ensuring that actions are compatible with land use planning instruments, environmental protection standards, and the province's socioeconomic development strategies. Each stakeholder plays a specific role, from supervision and issuing technical opinions to monitoring environmental studies, dialogue with communities, and logistical and institutional support, ensuring that the process is participatory, transparent, and aligned with local and national priorities.

The table below identifies and describes the most relevant institutions involved in this project.

Table 13: Table of institutions involved in the project

Institutional group	Main entities involved	Role in environmental/social matters
Central authorities (environment)	Ministry of Environment (MINAMB) – approval of EIAs, environmental licenses, national coordination of environmental policies	Conducts and controls the the country's environmental policy; approves environmental impact studies and licenses; leads public consultations
Agricultural and rural sector	Ministry of Agriculture and Forestry (MINAGRIF) – rural development policies, agricultural research, and family farming	Promotes food security and agricultural policies, including climate change mitigation of socio-environmental impacts in grain value chains for grains
Water and sanitation / water resources	Ministry of Energy and Water (MINEA) and National Water Directorate – sustainable management of water resources, licensing of hydraulic works	Regulates and supervises water use for irrigation and water infrastructure construction; involved in environmental plans for water
Planning and regulatory coordination	Ministry of Planning – interministerial coordination and definition de strategies de territorial development	Ensures strategic alignment between ministries in project implementation plans
Cartography and Territory	Angolan Geographic and Cadastral Institute (IGCA) – official cartography, national geographic information system	Supports the delimitation of implementation areas and identification of land use, basis for EIAs and zoning
Agencies of logistics infrastructure	ARCCLA (Cargo and Logistics Certification Regulatory Agency) – national logistics, certification, and agricultural transportation	Facilitates access to markets and transportation of stored grains; may be involved in silo logistics
Local/social implementation	Social Support Fund (FAS) and the Crescer Project – implementation of social infrastructure, social safeguard policies, and resettlement mitigation resettlement	Manages Social Components, , compensation, community consultations, and complaint mechanisms
Province and municipality	Governor Provincial; Municipal administrations Municipal; Municipal commissions (technicians, traditional leaders, administrators)	Authorizes resettlement actions; coordinates land acquisition processes, community consultations, and local implementation
Local traditional leadership	Soba chiefs and traditional community authorities – participation in municipal commissions and dialogues with communities	Represent community interests, negotiate land use, and participate in public consultation processes

Institutional group	Main entities involved	Role in the environmental/social sphere
Defense of environmental rights	Non-Governmental Organizations (NGOs)	Provide technical support and advocacy for environmental protection, community rights, and good social practices.
Project Implementation	Project promoter	Responsible forpreparation and implementation of measures to mitigation and plans for environmental and social management plans.
Financing and investment	African Development Development Bank (AfDB) and DFC	A financing institution that requires compliance with its Safeguards, including meaningful public consultations and proper management of .

3.7 NATIONAL PLANS, PROGRAMS, AND STRATEGIES

3.7.1 National Development Plan 2023-2027

Angola's National Development Plan (PND) 2023-2027 is a strategic instrument that guides public policies and investments necessary to promote the country's sustainable socioeconomic development. This plan is aligned with the **Long-Term Strategy "Angola 2050,"** which projects the country's future for the coming decades.

General Guidelines and Goals:

The PND 2023-2027 establishes guidelines to accelerate the sustainable socioeconomic impact of public policies, targeting areas that contribute significantly to the country's development.

The main goals include:

- **Human Capital Development:** Strengthen the education and health systems to improve the quality of life of the population.
- **Economic Diversification:** Reduce dependence on the oil sector by promoting other industries and services.

- **Infrastructure and Connectivity:** Improve transport, energy, and telecommunications infrastructure to facilitate economic growth.
- **Environmental Sustainability:** Implement policies that ensure environmental protection and the sustainable use of natural resources.

Main Axes:

The plan is structured around five priority areas for development:

1. **Human Capital:** Valuing and enhancing human capital, ensuring access to quality basic services.
2. **Economic Diversification:** Promote non-oil economic sectors to ensure inclusive and sustainable growth.
3. **Infrastructure:** Develop modern infrastructure that supports economic growth and regional integration.
4. **Environmental Sustainability:** Ensure efficient management of natural resources and protection of the environment.
5. **Governance and Institutions:** Strengthen public institutions to ensure transparency, efficiency, and citizen participation.

This plan reflects Angola's commitment to achieving balanced and sustainable development, in line with the global goals set out in **the 2030 Agenda** and the **Sustainable Development Goals (SDGs)**.

3.7.2 National Plan for the Promotion of Grain Production

The **National Plan for the Promotion of Grain Production (PLANAGRÃO)** is an initiative of the Government of Angola, approved by Presidential Decree No. 200/22 of July 23, 2022, which aims to significantly increase grain production in the country, contributing to food security, income generation, and the promotion of competitiveness in the agricultural sector.

General Guidelines and Goals:

PLANAGRÃO's main objective is to double annual grain production by 2027, reaching more than six million tons. Specific goals include:

- **Corn:** Increase production to 5,002,282 tons, cultivating 326,030 hectares.
- **Wheat:** Expand the cultivation area to 673,970 hectares.
- **Rice:** Achieve 600,000 hectares of cultivation.
- **Soybeans:** Cultivate 400,000 hectares.

These goals aim to reduce dependence on imports and ensure the country's food self-sufficiency.

Main Axes:

The plan is structured around strategic actions to achieve its objectives:

1. **Financing and Investment:** Make available approximately 1.7 billion kwanzas, operated by the Development Bank of Angola (BDA) and the Angolan Venture Capital Fund (FACRA), to support agricultural companies and producers.
2. **Agricultural Infrastructure:** Develop production support infrastructure, such as irrigation, storage, and transportation systems, especially in the eastern provinces of Angola (Lunda-Norte, Lunda-Sul, Moxico, and Cuando Cubango), which have vast lands and adequate water resources for growing priority grains.
3. **Training and Technology:** Implement training programs for farmers and technicians, promoting the use of modern technologies and sustainable agricultural practices to increase productivity.
4. **Market and Marketing:** Establish mechanisms to ensure the sale of production at fair prices, including the participation of the Strategic Food Reserve (REA) in the purchase of part of domestic production and the promotion of institutional purchases by the State.

The implementation of PLANAGRÃO is essential to transform Angola into the largest grain producer in southern Africa, ensuring food sovereignty and boosting the country's socioeconomic development.

3.7.3 National Food and Nutrition Security Strategy 2024-2034 (ENSAN II)

Angola's National Food and Nutrition Security Strategy 2024-2034 (ENSAN II) is a government initiative aimed at ensuring that all citizens have access to quality food in a sustainable manner, with a view to eradicating hunger and promoting food resilience in the country.

General Guidelines and Goals:

- **Eradication of Hunger:** Ensure that all Angolans have access to adequate food, eliminating hunger throughout the national territory.
- **Sustainability of Natural Resources:** Ensure the preservation of natural resources by promoting practices that maintain environmental integrity and the productive capacity of the land.
- **Strengthening Food Resilience:** Reinforce the country's capacity to face challenges such as climate change, price fluctuations, and other factors that may affect food security.

Main Pillars:

1. **Sustainable Production and Marketing:** Promote agricultural and marketing practices that ensure the continued availability of healthy and nutritious food.
2. **Access to Quality Food:** Implement policies that ensure all citizens, regardless of their location or socioeconomic status, have access to safe and nutritious food.
3. **Food and Nutrition Education:** Promote educational programs that encourage healthy eating habits and inform about the importance of a balanced diet.

4. **Research and Innovation:** Encourage scientific research at all stages of the food and nutrition chain, with a view to improving food production, conservation, and distribution techniques.
5. **Governance and Coordination:** Establish effective governance structures, such as the National Council for Food and Nutrition Security (CONSAN), to ensure the implementation and monitoring of proposed policies and actions.

ENSAN II is aligned with the Sustainable Development Goals (SDGs) and the Angola 2050 Long-Term Strategy, reinforcing the country's commitment to building a more sustainable and resilient food system.

3.7.4 National Environmental Quality Program

Angola's National Environmental Quality Program (PNQA), approved by Presidential Decree No. 138/20 of May 19, aims to improve the quality of life of Angolans living in urban, peri-urban, and rural areas, focusing on ensuring air, water, and soil quality.

General Guidelines and Goals:

- **Air Quality:** Collect and update information on sources of atmospheric emissions and their impact on health and the environment, with a view to reducing air pollution.
- **Water Quality:** Implement water quality monitoring systems, ensuring access to drinking water and the protection of water resources.
- **Soil Quality:** Promote sustainable land use practices, preventing degradation and encouraging the recovery of affected areas.

Main Axes:

1. **Legislative Development:** Draft and update legislation regulating the control and preservation of air, water, and soil quality, establishing national environmental quality indices.

2. **Environmental Education:** Promote environmental education at all levels of education, ensuring the involvement of society in the conservation, recovery, and improvement of the environment.
3. **Monitoring and Evaluation:** Implement environmental indicators to monitor the effectiveness of policies and actions, ensuring continuous improvement in environmental quality.

3.7.5 National Water Plan

Angola's National Water Plan (PNA), approved by Presidential Decree No. 126/17 of June 13, establishes guidelines for the sustainable management of the country's water resources, aiming to ensure the availability and quality of water for current and future generations.

General Guidelines and Goals:

- **Integrated Water Resources Management:** Implement an approach that considers the technical, social, economic, and environmental dimensions of water resources management, ensuring a balance between water supply and demand.
- **Infrastructure Development:** Promote the construction and maintenance of water infrastructure, such as dams, supply and sanitation systems, to improve access to drinking water and basic sanitation.
- **Environmental Conservation and Protection:** Adopt measures to preserve aquatic and terrestrial ecosystems, ensuring water quality and the sustainability of natural resources.

Main Axes:

1. **Watershed Planning and Management:** Develop specific plans for each watershed, considering regional particularities and promoting the participation of local communities in water resource management.
2. **Institutional Strengthening:** Empower institutions responsible for water management, ensuring the effective implementation of policies and strategies defined in the NAP.

3. **Education and Awareness:** Promote educational programs and awareness campaigns to raise public awareness of the importance of water conservation and sustainable use of water resources.

The NAP also coordinates with other sectoral plans and national strategies, such as the National Irrigation Master Plan (PLANIRRIGA), which aims to develop irrigated agriculture in the country, contributing to food security and rural development.

3.7.6 National Irrigation Master Plan (PLANIRRIGA)

Angola's National Irrigation Master Plan (PLANIRRIGA) is a strategic initiative designed to promote sustainable agricultural development in the country by identifying and optimizing the irrigation potential of Angolan land.

General Guidelines and Goals:

- **Identification of Potential Areas for Irrigation:** PLANIRRIGA analyzed approximately 17.5 million hectares, of which about 7.5 million were identified as highly suitable for irrigation, with 80% of these areas classified as highly to moderately suitable.
- **Regional and National Development:** The plan aims to support regional and national development by proposing measures and actions in the agricultural hydraulics sector throughout Angola.

Main Axes:

1. **Rehabilitation and Expansion of Irrigation Infrastructure:** The plan proposes the recovery of existing irrigated areas and the construction of new infrastructure to increase the irrigated agricultural area.
2. **Technical and Institutional Capacity Building:** It is expected to strengthen the technical and institutional capacities of those involved in the management and operation of irrigation systems, ensuring the sustainability of projects.

3. **Promotion of Sustainable Technologies:** The adoption of efficient and sustainable irrigation technologies is encouraged, with a view to optimizing water use and conserving natural resources.
4. **Integration with Agricultural Policies:** PLANIRRIGA is aligned with other national agricultural policies and strategies, contributing to food security and reducing food imports.

3.7.7 National Strategy for Climate Change 2022-2035

Angola's **National** Strategy **for Climate Change 2022-2035 (ENAC 2022-2035)** was established by Presidential Decree No. 216/22 of August 23, 2022, with the aim of coordinating objectives, instruments, and institutions to promote sustained economic growth and sustainable development in the face of climate change.

General Guidelines and Goals:

- **Adaptation and Mitigation:** ENAC 2022-2035 aims to adapt Angola to the impacts of climate change and promote low-carbon development, contributing to the eradication of poverty and improving the quality of life of Angolans.
- **Emissions Reduction:** The plan sets targets for reducing greenhouse gas emissions, aligning with Angola's international commitments under the Paris Agreement.

Main Axes:

1. **Institutional Strengthening:** Strengthen the capacities of national institutions for the effective implementation of climate change policies and measures.
2. **Policy Integration:** Ensure that climate considerations are integrated into sectoral and national development policies, plans, and programs.
3. **Sustainable Management of Natural Resources:** Promote sustainable natural resource management practices aimed at biodiversity conservation and ecosystem resilience.

4. **Promotion of Renewable Energy:** Encourage the use of renewable energy sources to reduce dependence on fossil fuels and decrease greenhouse gas emissions.
5. **Education and Awareness:** Implement public education and awareness programs on climate change, aiming to increase society's awareness and participation in mitigation and adaptation actions.

ENAC 2022-2035 represents Angola's commitment to addressing the challenges of climate change by promoting sustainable and resilient development for future generations.

3.7.8 National Action Program to Combat Desertification (PANCD)

Angola's National Action Program to Combat Desertification (PANCD) was established by Presidential Decree No. 46/14 of February 14, 2014, with the aim of addressing the challenges of desertification and promoting sustainable land management in the country.

General Guidelines and Goals:

- **Poverty Reduction and Social Inequality:** The PANCD seeks to reduce poverty and social inequalities by sustainably increasing productivity in regions subject to drought and soil degradation.
- **Sustainable Management of Natural Resources:** The program aims to improve productive capital, including soil, water, and natural biological resources, as a way to combat desertification and promote environmental sustainability.

Main Axes:

1. **Promotion of Sustainable Agricultural Practices:** Encourage agricultural techniques that conserve soil and water, reducing erosion and improving soil fertility.

2. **Reforestation and Recovery of Degraded Areas:** Implement tree planting and land recovery programs in areas affected by desertification, with a view to restoring native vegetation and biodiversity.
3. **Capacity Building and Awareness Raising among Local Communities:** Develop environmental education and capacity building activities so that communities adopt sustainable practices and actively participate in the conservation of natural resources.
4. **Institutional and Political Strengthening:** Create a favorable institutional environment for actions to combat desertification, including the formulation of public policies and coordination between different government sectors.
5. **Continuous Monitoring and Evaluation:** Establish monitoring systems to assess the effectiveness of the actions implemented and adjust strategies as necessary.

Desertification is a significant concern in Angola, affecting about 31% of the national territory, especially in semi-arid and sub-humid regions along the coast, mining areas, and areas with intense forestry and livestock exploitation.

The PANCD represents the country's commitment to addressing these challenges and promoting sustainable and resilient rural development.

4 JUSTIFICATION OF THE EIAS

The construction of agricultural infrastructure "Silos" to increase grain storage capacity in Balombo is a strategic necessity that brings multiple benefits, from reducing losses to improving product quality. Investing in storage infrastructure is essential to strengthen agriculture, increase profitability, and ensure food security, thereby promoting sustainable rural development.

Although these projects are crucial to the efficiency of the food chain, it is imperative to consider the environmental and social impacts associated with their planning, construction, operation, and decommissioning phases.

The construction of the silos is part of the expansion and diversification of the activities of the Carrinho, SA group. This group intends to expand its silo network to various locations across the country to store grain produced in the regions where these infrastructures will be built, in order to facilitate internal distribution and export, as well as to extend the shelf life and quality of the grain.

This Environmental and Social Impact Study is intended to assess the potential environmental impacts and propose mitigation measures caused by the construction of the Carrinho, SA Group silos.

Under the combined provisions of Article 16 of Law No. 5/98 of June (Basic Environment Law), and Article 112(d) and Article 113, both of the Constitutional Law, the Government created the Regulation on Environmental Impact Assessment and Environmental Licensing Procedure (Decree No. 117/20 of April 22).

This decree establishes a set of procedures to be followed in the preparation of Environmental Impact Studies, proceeding to the approval by the competent state body of the project subject to EIA, as well as the rules for its implementation.

These studies must focus on projects which, due to their nature, size, or location, may have implications for environmental and social balance and harmony, so that the EIA constitutes an effective instrument for environmental protection and management, as well as for ensuring fair and balanced decisions by the public administration.

This Environmental Impact Study was prepared in accordance with the provisions of Article 4 of Decree No. 117/20 of April 22, which regulates environmental protection during the construction of the Balombo Agricultural Infrastructure for Grain Storage "Silos" and requires the preparation of an Environmental Impact Assessment.

We also took into account Executive Decree No. 92/12 of March 1, which approves the Terms of Reference (TOR) for the Preparation of Environmental Impact Studies and establishes the guidelines for the preparation of the Environmental Impact Studies necessary for the environmental feasibility analysis of projects subject to environmental impact assessment.

According to Article 2, the Environmental Impact Study must be prepared in accordance with the legislation on Environmental Impact Assessment and strictly comply with the Terms of Reference approved by the Ministry of the Environment, which guides their preparation according to the specific nature of each project.

4.1 OBJECTIVES OF THE EIAS

The purpose of this Environmental and Social Impact Assessment is to conduct baseline studies for the construction of agricultural infrastructure for grain storage "Silos" in the municipality of Balombo by the Carrinho, SA group. This includes gathering information and assessing the current environmental and social situation, analyzing and recording the current characteristics and dynamic behavior of its components.

The EIAS must also fully comply with the following objectives:

- **A summary description of the project;**
- **Identification of Potential Impacts:**
  - Analyze the direct and indirect effects of the construction of the Balombo silos on the surrounding environment;
  - Assess the impacts on soil characteristics, air quality, and water resources, etc.
- **Mitigation and Compensation:**
  - Propose mitigation measures to minimize negative impacts;
  - Identify opportunities for environmental , such as projects for reforestation or preservation of natural areas.
- **Community involvement:**
  - Include the active participation of the local community in identifying concerns and solutions;
  - Promote transparency and effective communication about construction plans and their impacts.
- **Legal Compliance:**
  - Ensure that the project complies with environmental regulations and local standards;
  - Collaborate with the competent authorities to obtain the necessary licenses and approvals.
- **Propose an environmental monitoring plan for the different phases of project implementation.**

4.2 SCOPE OF THE EIAS

4.2.1 Project scope and location

The project is located in the province of Benguela, municipality of Balombo. It occupies an area of approximately 745 m^2 [2], which corresponds to the total area of the concession, as shown in the location of the unit below (Figure 1).

Figure 1 - Geographical location of the project implementation area

The project implementation site is bounded by the following coordinates:

Table 14: Geographic coordinates of the project area

POINTS	LATITUDE	LONGITUDE
1	12°20'59.17"S	14°47'40.44"E
2	12°20'59.17"S	14°47'39.78"E
3	12°20'59.85"S	14°47'39.77"E
4	12°20'59.83"S	14°47'40.67"E

4.2.2 Boundaries

The project is located within the following boundaries:

- North: Vacant lot;
- South: Vacant lot;
- East: Vacant lot;
- West: Vacant lot.

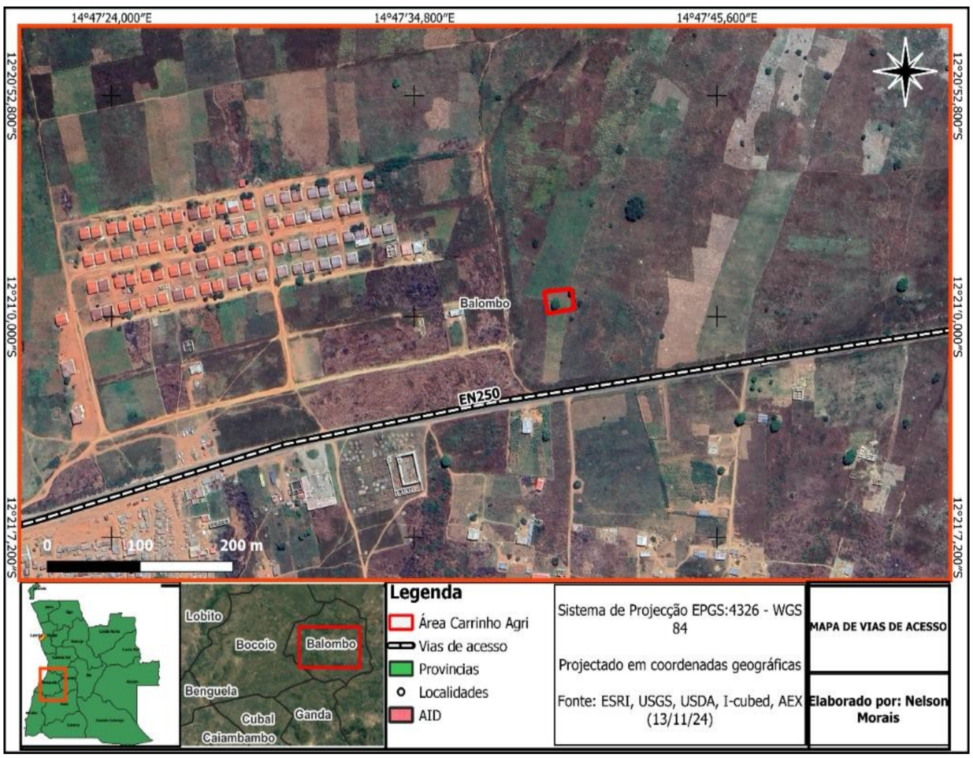


Figure 2 - Map of boundaries.

4.2.3 Access roads

The area where the project is located has a road network around the project area. The main access road is the EN 250, as shown in Figure 3, with the respective landmarks and other planned streets.

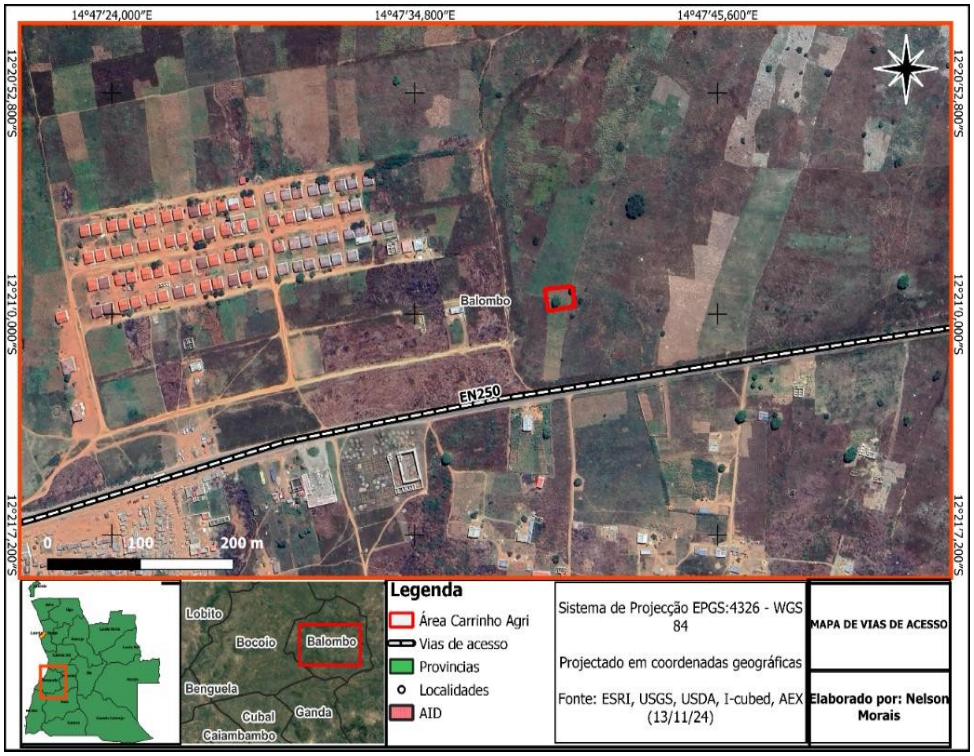


Figure 3 - Access road map.

4.3 THEMATIC SCOPE - DESCRIPTORS UNDER ANALYSIS

Defining the thematic scope of the EIAS is an important requirement for the correct development of the study, as it allows the areas of analysis to be covered to be identified and, above all, their level of detail, depending on the type of impacts that are expected to be induced by the project and the specificity and sensitivity of the environment that will host it. Although the areas of study, as well as the aspects to be included in the analysis, may take into account the provisions of the legislation on Environmental Impact Assessment, it is important to recognize at this stage which environmental descriptors deserve particular attention and, consequently, further study.

Therefore, this EIAS will analyze the following environmental descriptors:

- Climate
- Geology and Geomorphology
- Soils and Land Use

- Surface and groundwater resources
- Flora and fauna
- Landscape
- Air quality
- Noise environment
- Socioeconomic
- Infrastructure
- Land use planning
- Historical and cultural heritage.
- Waste

4.4 EIA METHODOLOGY

The following methodology was used to prepare this environmental impact study:

- For each environmental descriptor, a characterization of the reference situation was made, which fundamentally aims to assess the current environmental situation;
- Based on the characterization of the reference situation and existing knowledge about the project components, the relevant environmental impacts on each environmental descriptor were identified and assessed;
- When impacts resulting from the Project with significant effects on a given component were identified, environmental mitigation measures were defined in order to avoid, mitigate, and compensate for the negative impacts and/or enhance the positive impacts identified;
- If there is still a degree of uncertainty about the importance of a particular environmental impact, or about the effectiveness of the proposed mitigation measures, environmental monitoring programs are proposed;
- Finally, the conclusions of the EIAS are presented, providing a summary assessment of the Project's environmental sustainability, taking into account the current state of the environment, the impacts identified, and the proposed mitigation and monitoring measures.

The structure of this EIAS reflects the general methodology adopted and comprises the following volumes and respective chapters:

Volume I, corresponding to **the Non-Technical Summary**, which summarizes in more accessible language the main aspects analyzed in the EIAS Summary Report.

Volume II, corresponding to **the EIAS Synthesis Report**, subdivided into the following chapters:

- ***Chapter 1*** - ***Executive Summary -*** presents a concise summary of the EIAS Report in non-technical language, including the environmental and social reference conditions, the alternatives considered, the mitigation measures; the monitoring program, consultations with stakeholders, the technical and institutional capacity of the entities involved in the implementation of the project; and the cost implications;
- ***Chapter 2 – Introduction –*** this chapter presents the introductory and contextual aspects of the analyses produced in the EIAS;
- ***Chapter 3*** - ***Legal Framework -*** identifies and analyzes the legal instruments and international conventions to which Angola is a signatory that have an impact on environmental impact assessments, as well as the relevant environmental, climate, and social policies of the African Development Bank;
- ***Chapter 4*** - ***Project Justification -*** presents the project's objectives and justifies the need for its implementation;
- ***Chapter 5 - Project Description*** - describes the main characteristics of the project and the construction work, including the characteristics of the structures to be installed;
- ***Chapter 6 - Characterization of the Reference Situation*** - which characterizes the current state of the environment;
- ***Chapter 7 - Environmental and Social Impact Assessment***, which analyzes the potential impacts of the project's implementation on the environment in terms of their value, magnitude, and significance;
- ***Chapter 8 - Environmental and*** Social ***Mitigation Measures*** - in which, depending on the impacts identified, environmental measures will be proposed to minimize or compensate for negative impacts and enhance positive impacts;

- ***Chapter 9 -*** Cumulative ***Impacts*** - Residual Impacts and Environmental Risks, identifies residual impacts, understood as negative impacts that cannot be mitigated. The environmental risks associated with the Project are also analyzed, both in the construction and operation phases;
- ***Chapter 10 - Environmental and*** Social ***Monitoring and Management*** - in which, where applicable, the environmental monitoring and environmental management programs for the various phases of the Project will be defined;
- ***Chapter 11*** - ***Environmental and Social Management Plan -*** describes the management measures, procedures, functions, responsibilities, schedule, monitoring, and implementation costs presented in the ESMP;
- ***Chapter 12*** - ***Institutional Capacity and Strengthening Plan -*** describes the level of capacity of the entity responsible for the project in relation to supervising the implementation of the ESMP.
- ***Chapter 13 –*** Public ***Consultation and Participation –*** describes the social participation processes carried out during the preparation and evaluation of environmental projects or plans.
- ***Chapter 14 – Technical and Knowledge Gaps*** – aims to identify all missing background information that, if acquired, would complement the analyses carried out;
- ***Chapter 15 – Conclusions and Recommendations*** – summarises the main conclusions reached during the study;
- ***Chapter 16 - Bibliography and Documentation Consulted*** - lists the main sources of information and works consulted.
- ***Chapter 17 - Appendices -*** Contains all appendices relating to this study.

4.5 ENTITIES CONSULTED

During the course of this EIA, several entities were contacted in order to gather information that would allow for a better characterization of the area affected by the implementation of the Project and its environmental impacts. Information was requested from various entities, and contacts were made in order to obtain the desired information.

- Benguela Provincial Government (provincial environment department);
- Balombo Municipal Administration (Municipal Directorate for the Environment and Basic Sanitation).

5 PROJECT DESCRIPTION

5.1 JUSTIFICATION FOR THE PROJECT LOCATION

Carrinho is an Angolan family business committed to developing the first vertically integrated organizational structure in the food sector, managing all stages of the process: sourcing, transportation, storage, processing, and marketing.

Recognized as one of the best companies in Angola investing in agriculture and the industrial sector, with several factories throughout the country, the grain silo project will be located in a rural area with road infrastructure, less than 100 meters from the EN-250 road connecting the cities of Balombo and Benguela.

This will enable all products (grains) purchased in the municipality of Balombo or in the interior of the different municipalities of Benguela province by the Carrinho group to be transported and stored in these silos and then distributed to various points throughout the country.

The following factors were taken into account when choosing the location of this Silo Center:

Economic

Protection against deterioration and pests significantly reduces losses, increasing the amount of grain that can be sold.

Storing grain allows producers to sell during periods of high demand, obtaining better prices and increasing profit margins.

Adequate infrastructure facilitates inventory control and management, making the process more efficient and reducing operating costs.

The economic advantages provided by the construction of grain storage silos are significant, directly benefiting farmers and the regional economy. This infrastructure is essential to ensure the sustainability and competitiveness of the agricultural sector.

Social

The project is justified by the generation of jobs and income, growth in the regional economy due to the provision of services, preference for local labor, and improvement in the quality of life of the population.

Environmental

As this is a rural area with a variety of activities and agricultural fields, the project will have some impacts during its implementation. In order to minimize these impacts, it is expected that all mitigation and compensation measures will be complied with during the project's implementation, thus mitigating various impacts resulting from the project's implementation.

Location

The project will be located in a rural, flat area with mixed characteristics.

- Potentially industrial zone;
- Within the municipal seat;
- Close to the national road connecting the municipality of Balombo to Ganda;
- No conflict with land use and occupation;
- Few urban areas near the project;
- Availability of adequate access roads facilitating the transport of goods, also facilitating the arrival of raw materials and necessary inputs;

5.2 LOCATION ALTERNATIVE

5.2.1 Location and technological alternatives for the execution of the project

Alternatives in terms of location and technology were not considered or discussed for the following reasons:

i) this is a project to install silos for grain storage, thereby boosting national production;

ii) it is located in a rural area with great productive potential and in an area with easy access for product distribution;

iii) iii) there are no urban constraints preventing the location from being chosen;

Several important aspects were taken into account when choosing the most suitable area for the installation:

- An area defined as mixed with private developments;
- Presence of several access roads, notably the EN250 and the railway line;
- Increase in trade, import, and export of products in the various countries connected to ours by road and by the Benguela railway;

5.2.2 Alternatives to not implementing the project

The possibility of not implementing the project will have an impact on the economic aspects of the municipalities. In addition, not implementing the project will frustrate the expectations of development that are being created in the municipality and/or province. Another issue concerns the lack of promotion of the regional economy, given that the project will increase youth employment and also the transport of agricultural products to different areas of the country where they will be marketed.

5.3 GEOGRAPHICAL CONTEXT

The proposed project will be implemented in an area corresponding to 745 $m^2$and will be constructed of reinforced concrete, mesh, metal structures, and sheet metal, etc.

The project consists of the construction of grain storage silos with a storage capacity of 20,000 tons. The following products are expected to be stored: Corn, Wheat,

with drying included in different locations in Angola.

The silos with a storage capacity of 20,000 tons consist of:

- 1 weighbridge with a capacity of 60 tons;
- 1 road reception circuit with a capacity of 160m³/h (120t/h), with pre-cleaning of straw;
- 2 conical bottom buffer silos with a total capacity of approximately 1350m³, i.e., 500 tons capacity for each silo. For example, Ø8.9m, cylinder height 14.94m, and total height 17.48m;
- 1 dryer with an output capacity of 50 t/h for corn;
- flat-bottom silos for storage distributed along a line, with a total capacity of approximately 26,700 m³, i.e., 5,000 tons of capacity for each silo. For example, Ø19.54 m;
- Aeration system in storage silos;
- 1 road shipping circuit with a capacity of 135 m³/h (100 t/h);
- Electrical installation;
- Supervision system.

As illustrated below in the layout of the facilities (Figures 4 and 5)

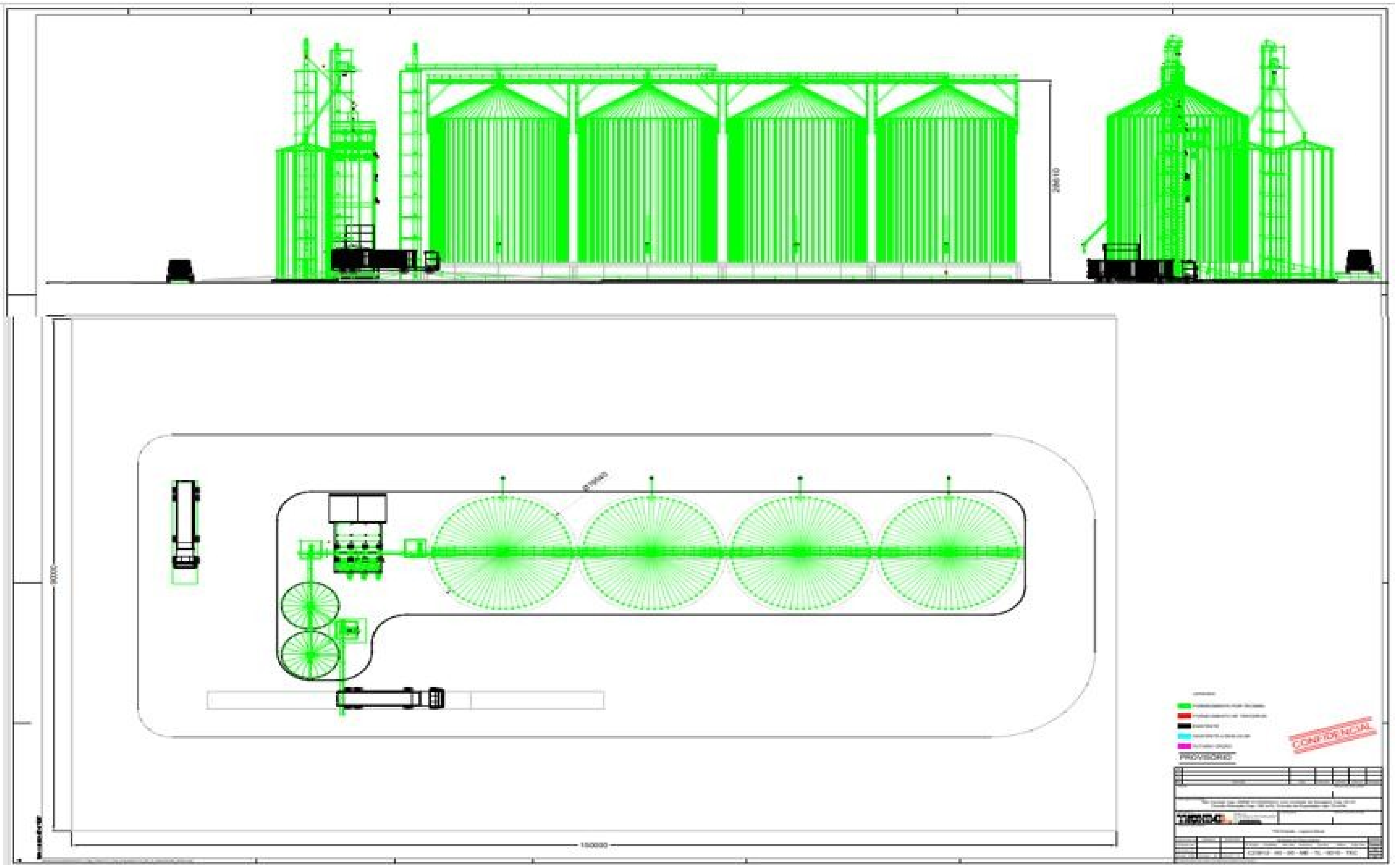


Figure 4 – Flow diagram (1)

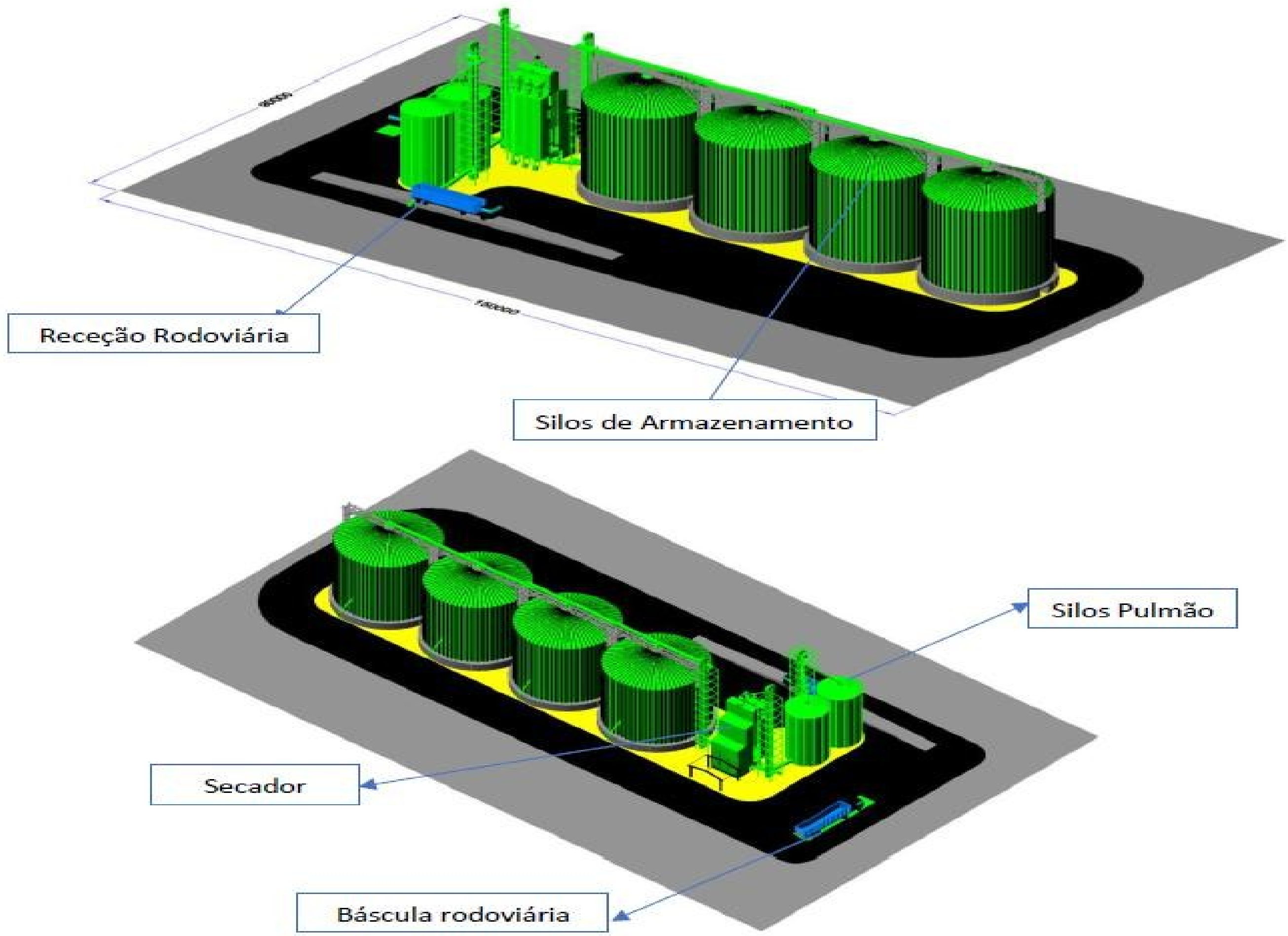


Figure 5 – Flow diagram (2)

5.4 GENERAL CHARACTERISTICS OF EXISTING INFRASTRUCTURE

At the site designated for the project, construction work is underway on support areas, including other basic infrastructure. An area has been set aside for the installation of agricultural infrastructure (silos) for the storage of grain from various parts of the municipality in order to meet demand and distribution needs.

The existing facilities are distributed as follows:

- Administrative area;
- 1 warehouse
- 1 generator house and storage facility
- 1 Guardhouse;
- Raw material storage area.
- Three-bedroom residence, etc.

Figure 6 – Project implementation area (infrastructure under construction)

Figure 7: Administrative area

 Figure 8: Guardhouse	 Figure 9: Temporary warehouse

5.4.1 Access roads

In order to facilitate the circulation and distribution of products, the silos are being built next to the EN 250 national road, which connects the cities of Balombo and Benguela.

Figure 10 – National road No. 250

5.4.2 Pavements

Two types of pavement will be used, depending on their function: rigid pavement and flexible pavement.

Rigid pavement will be used in areas where water and hydrocarbon spills may occur, as it is more resistant.

Flexible pavement will be used in traffic areas.

Both pavements have been designed according to the type of stress to which they will be subjected, the bearing capacity of the foundation soils, and the mechanical characteristics of the constituent materials.

5.4.3 Earthworks

According to the topographical survey of the intervention area, the terrain is relatively flat, but excavation will nevertheless be necessary.

Excavation and earthworks will be necessary to secure the foundations, and in certain areas it will be necessary to replace soil for landfill and soil compaction purposes in order to improve the base.

5.4.4 Support infrastructure

For the construction of the new project units, various infrastructures will provide support for its implementation, notably the EN-250 national road to facilitate the movement of vehicles and machinery, transport and distribution of grain, etc. A support yard will also be built for the construction of the silos, which should be built within the boundaries of the project area.

5.4.5 Expected consumption

The estimated consumption for the installation and operation phase of the project is structured as follows:

a) Water Supply

During the construction phase of the project, water will be supplied by tanker trucks and boreholes. The unit will have several reservoirs for water storage. During the operational phase, it is estimated that the unit will also rely on water from boreholes, as the location where it is being implemented is not covered by the public water network.

Measures should be taken to reduce water consumption and avoid waste.

b) Domestic Wastewater Drainage Network

The domestic wastewater drainage network comprises the conveyance of wastewater from buildings through discharge branches, which connect to manholes, giving rise to a collector that conveys wastewater by gravity to secondary treatment facilities (septic tanks).

The domestic wastewater drainage system is of the separate type, consisting of a network for the evacuation of "soapy water" and another for wastewater from toilet bowls.

During the construction and operation of the Silo Plant, liquid effluents will be generated mainly from sanitary sewers, effluents resulting from the washing of equipment and materials used in the construction and maintenance of the facilities.

Effluents from sanitary sewers will be sent and stored in septic tanks, while those resulting from equipment maintenance and likely to contain some contamination will be stored in specific, properly identified containers and sent for treatment before disposal and/or reuse.

c) Rainwater drainage network

During the construction phase, the unit will not have a rainwater drainage system, as rainwater will be drained and absorbed naturally by the soil.

For the operational phase, the rainwater drainage system will have two fundamental systems: at roof level and at ground floor level.

d) Electricity

The municipality of Balombo is supplied with electricity from the ENDE public grid, but the supply is still insufficient, requiring the use of alternative energy. For the implementation of the project, generators will be installed with a capacity according to the project's needs, powered by diesel or gasoline. The unit will also have fuel storage tanks, adequate for the needs of the project during the construction and operation phases. For this construction phase, the project has a 7 kva generator for the works.

Therefore, measures should be taken to reduce energy consumption, as well as to avoid waste and monitor gas emissions.

e) Telecommunications

During the field visit, no public telecommunications network was found. The only telecommunications resource in the project implementation area is private mobile telephony.

f) Air conditioning

The project will be equipped with a ventilation system that will ensure thermal comfort for users throughout the construction and operation phases.

g) Fuel

During the construction phase, the fuel to be used will be diesel and gasoline, depending on the type of equipment, capacity, and technical specifications.

5.4.6 Labor

The labor will be divided into two phases: Construction phase and Operation phase. It will involve around 40 workers, including nationals and expatriates.

5.4.7 Schedule

The construction project for the silos belonging to Grupo Carrinho, SA, will last 26 months, starting in 2025, with completion expected in 2028.

5.4.8 Investment Value

The total investment for the implementation of the project is estimated at **USD 4,168,000.00** (four million, one hundred and sixty-eight thousand dollars), or the equivalent in Kwanzas according to the exchange rate on the day.

5.5 GENERAL AND OPERATIONAL CHARACTERISTICS OF THE SILOS

Silos are storage units characterized by airtight cells or compartments, which minimize exchanges between the external environment and the storage environment. They offer storage conditions for longer periods than ordinary warehouses, as they allow for more efficient control of sources of deterioration.

There are different types of vertical silos, depending on the material used for their construction, which can be metal, concrete, masonry, and wood (used for seed storage). The basic differences between structures built with different materials are related to:

- Initial cost, which varies greatly between them;
- Different repair needs over time; and
- Greater or lesser difficulty in eliminating infestations of organisms harmful to grain conservation.

The size of each structure depends on the amount of grain to be stored and the storage time, as well as the number of harvests per year. For large producers, it is better to have more medium-sized silos, i.e., with a capacity to store volumes of two to three thousand tons per silo.

Wooden silos: for small volumes of seeds – 60 to 80 tons;

Masonry silos: can store from 100 to 1,200 tons;

Concrete silos: from one to three thousand tons or more; and

Metal silos: can hold six thousand tons or more.

The most commonly used silos today are those made of concrete and metal.

<u>Concrete silos</u>

Advantages:

- Less space occupied due to vertical position;
- Thick walls, which prevent heat transfer to the grain mass; and

- Better grain preservation due to longer storage time. Disadvantages:

- High cost and long installation time;
- High maintenance cost; and
- High incidence of grain breakage due to the height of the silo.

Metal silos

Advantages:

- Simpler and lower-cost foundations;
- Lower cost per ton stored than concrete silos; and
- Medium capacity cell that allows for greater operational flexibility.

Disadvantages:

- Possibility of moisture infiltration;
- Possibility of gas leakage during the purging process;
- Heat transfer from the environment into the cell, which may cause condensation; and
- Higher installation cost than bulk storage facilities.

5.5.1 Process description

In stored grains, the most important organism is the grain itself. Although its life cycle is temporarily suspended (dormancy stage), it has all the properties of a living organism.

Grains should be harvested immediately after reaching physiological maturity, that is, when their dry matter reaches maximum weight. From that point on, if the product is not harvested, processed, and stored properly, losses will increase.

However, at the point of physiological maturity, the grains have high moisture content, both for harvesting and storage, and may be mixed with seeds from other plants that are still green (invasive or from previous crops). In this case, pre-cleaning, cleaning, and drying processes are necessary before actual storage, according to the harvest conditions, as shown in the following diagram.

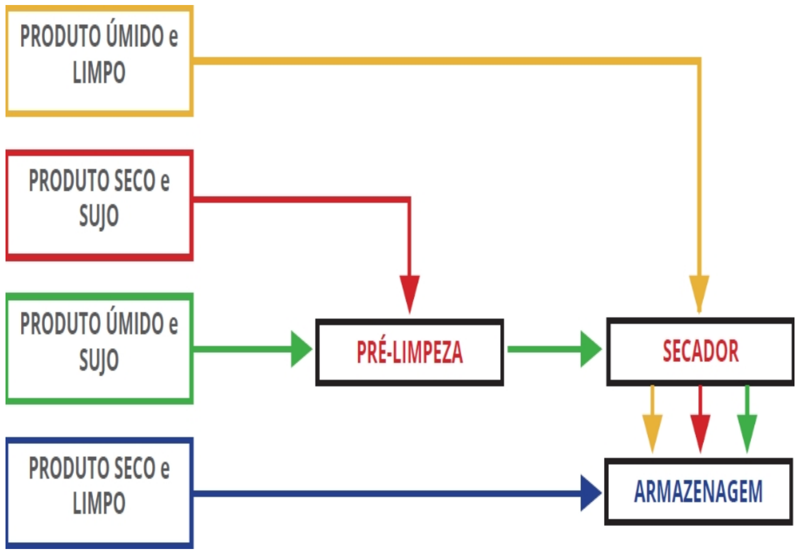


Figure 11 - Diagram of grain storage stages using a conventional system

Losses during storage can occur due to:

- Inadequate unloading of the product into the warehouse, which causes mechanical damage (broken and cracked grains);
- Grain mass with many impurities;
- Grain mass with different water contents;
- Incorrect drying of grain; and
- Poor air circulation in the storage area.

Temperature and humidity can be altered to ensure grain quality during storage. Therefore, they must be measured and controlled.

Figure 12 - Factors that most affect grain quality during storage

5.5.2 Importance of water content in stored grains

Water content is an important factor in controlling losses in stored grain. If humidity is kept at low levels, other harmful factors can be easily controlled. Table 1 shows the water content of grain in relation to harvesting and storage.

Table 15: Moisture content of some grains in relation to harvest and storage

Percentual de umidade					
Produto	Colheita	Ideal	Armazenamento seguro		
	Máximo	Ótimo	Após secagem	1 ano	5 anos
Café	62	62	12	11	10
Milho	23	20-22	11	11	9-10
Arroz	21	17-19	11	11-12	9-10
Soja	18	16	11	11-12	9-10
Sorgo	26	23-26	9	11-12	9-10
Trigo	23	15-17	8	12-13	10-11

To determine the harvest point for grains, it is necessary to determine their moisture content under field conditions. The result indicates whether they are ready to be harvested and whether or not they will need to have their moisture content reduced through artificial drying for storage.

The recommended moisture content for manual grain harvesting is shown in Table 2. For most grains, such as rice, beans, and corn, the moisture content varies between 18 and 20%.

Produto	Teores de umidade (%)
Arroz	18 a 24
Feijão	16 a 18
Milho	18 a 24
Soja	16 a 18
Sorgo	18 a 20
Trigo	18 a 20
Café	11 a 12

Table 16: Moisture content of grains at harvest

Note: To be stored, harvested grains need to have a moisture content of 12 or 13%, a level achieved by drying in a yard or in a dryer.

5.5.3 Interference of temperature on the quality of stored grains

Increased temperature is another factor that affects grain storage and can be caused by other factors related to quality loss. Therefore, controlling temperature can prevent rapid deterioration.

The heating of stored grain is caused by fungal attack and occurs when the moisture content of the grain is above the correct level for storage, as shown in Table 1.

Note:

1. To control the temperature, it is necessary to have an environment that allows for good air circulation.
2. Grain should be stored at the correct moisture content.

5.5.4 Characteristics of stored grain mass

Grain mass has certain characteristics that can compromise or guarantee its quality and must therefore be observed.

- **Porosity of the mass:** when stored in silos, containers, or bags, grains form a porous mass consisting of themselves and the space occupied by air, which represents around 40 to 45% of the total volume.
- **Thermal conductivity:** grains exchange heat between themselves and their porous mass. Heat passes from a warmer region to a cooler one, from grain to grain, as they are in contact (conduction), and through the air flow passing through the porous mass (microconvection).
- **Grain moisture balance:** the moisture content of the grain mass remains in balance when there is a positive relationship between relative air humidity and temperature. If relative air humidity and temperature vary greatly, the grains lose or gain moisture according to the low or high relative air humidity.

Note: To store grain properly, it must be kept under conditions that hinder or prevent the growth of microorganisms and insects that cause loss or damage. To this end, the water content, relative humidity, and temperature must be in balance.

5.5.5 Losses that occur during grain storage

- **Physical loss or breakage:** occurs when the product suffers weight loss due to damage caused mainly by insect attacks. Other animals, such as rodents and birds, also cause losses, but these are smaller compared to those caused by insects.

Figure 13 - Grain breakage during unloading

- **Loss of quality:** occurs when the quality of the product changes, mainly due to the action of fungi, which cause fermentation, alteration of the natural taste and smell of the product, and reduction of the nutritional value of the grains.

Contamination by foreign matter and other damage that affects the quality of grains for agribusiness are among the factors that lead to quality losses. Contamination can be biological, physical, or chemical, and can occur alone or in combination.

Figure 14 - Contamination of grains by fungi

5.5.6 Warning signs and damage in grain storage

- General appearance of mold and fermentation;
- Mixture of foreign species harmful to the use of the product; and
- Unusual odor of any kind, inappropriate for the product and harmful to consumption.

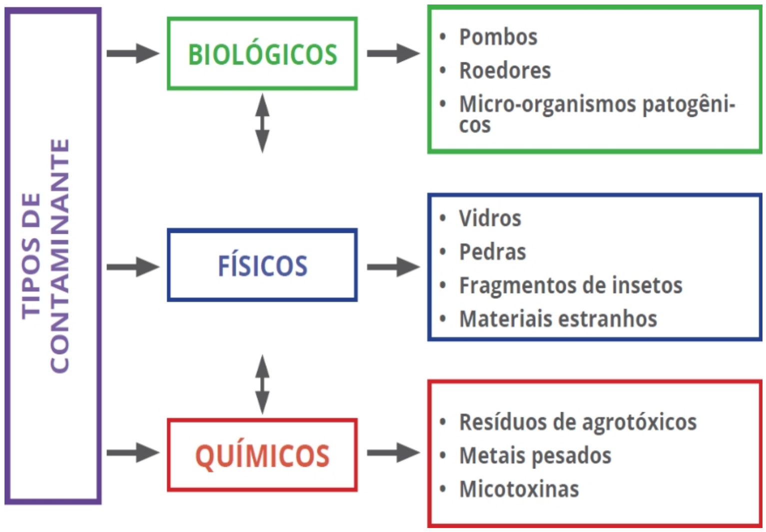


Figure 15 - Biological, physical, and chemical contaminants in stored grains

5.5.7 Contaminants in the external environment of the grain storage unit

It is necessary to identify and control possible contaminants that influence the quality and isolation of stored grains. Therefore, monitoring and control actions must be planned.

Table 17: Identification of biological hazards in post-harvest and grain storage

ÁREA DAS UNIDADES ARMAZENADORAS (Entorno do paiol, solo, galpão etc.)			
PERIGO BIOLÓGICO	*Salmonella Coccidiose**	SEVERIDADE MÉDIA	RISCO ALTO
JUSTIFICATIVA - Presença de fezes de aves (pombos*)			
MEDIDAS PREVENTIVAS • Colocar telas para evitar a entrada de aves na unidade armazanadora • Evitar grãos esparramados no pátio da unidade armazenadora			
PERIGO BIOLÓGICO	LEPTOSPIROSE	SEVERIDADE MÉDIA	RISCO ALTO
JUSTIFICATIVA - Presença de urina e fezes de ratos			
MEDIDAS PREVENTIVAS Controlar insetos e roedores (MIP)			

5.5.8 Insects and pests

Insects that attack grains during storage can be classified as:

- **Primary pests**

Primary pests attack and infest undamaged grains and also feed on damaged ones. Most of them can begin their infestation and attack in the field, before harvest.

- **Secondary pests**

Secondary pests attack the interior of damaged or already attacked grains.

5.5.9 Factors that contribute to insect pest attacks

High temperatures and high humidity increase infestations of primary and secondary pests.

Combined conditions of temperatures between 25 and 34°C and relative humidity of around 70% are considered risky.

While the moisture content of stored grain can be a risk for pest attack, it is also important to prevent infestation in the grain mass. Dry grain, with a moisture content of less than 12%, does not allow the development of most insect pest species, with the exception of a few, such as stem borers, which attack exceptionally dry grains with less than 8% moisture.

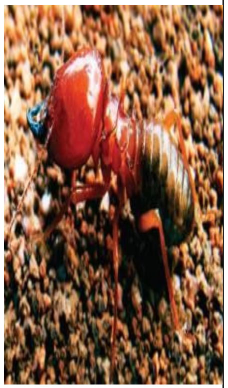
Table 18: Types of pests that can affect grain

PRIMARY PESTS				
TYPE OF PEST	**CHARACTERISTICS**	**PREFERRED CROPS**	**DAMAGE**	**IMAGE**
Grain weevil (*Sitophilus* spp.)	This is one of the most dangerous pests for all types of grain. It is characterized by a narrow, pointed snout (rostrum), which is an extension of the head, and has a brownish-bronze or dark brown body. bronze or dark brown body.	They attack cereals, mainly corn, sorghum, rice, and wheat. They do not attack small grains, such as millet, because their larvae do not develop well. They also feed on dry cassava and processed food.	Infestation usually begins in the field, when eggs are laid in undamaged grain. After harvest, the infested grain is transported to the warehouse where the larvae emerge and leave a characteristic hole . Both the larvae and the adult insects cause damage, but the larvae are responsible for most of the economic losses.	
Grain weevil (*Prostephanus truncatus*)	Native to Central America, this beetle is one of the most important pests that attack stored grain in tropical and subtropical regions. It is dark brown or black in color and also feeds on corn stalks, cob and wood debris, and dry foods.	It is a highly destructive primary pest for corn, especially for the product stored in cobs. Its damage has been so high that storage in cobs It is no longer encouraged in some places and has been replaced by straw-free storage, which is treated beforehand. The cereal weevil can also feed on dry cassava and flour products.	Infestation usually begins in the field before harvest and continues during storage, especially in corn still with straw. Both the adult beetle and the larva enter the grain and produce large amounts of dust. On average, losses can reach 30% of stored corn.	

Grain beetle (*Rhyzopertha dominica*)	Originally from South America, it is now found in all warm and humid climates around the world. This small brown or black weevil is very voracious.	It is a devastating pest of most cereal grains, including millet, although it is not very common in rice. It also feeds on cassava and other starchy products.	The infestation begins in the field and the larva, introduced into storage systems, attacks the interior of the grains, where it develops. Adult insects and larvae pierce the grains and feed on the endosperm. This process causes a lot of dust, which, when present, can be an indication of a high infestation. The grain beetle has a long life cycle and daily destroys an amount of grain equivalent to its body weight.	
Cereal moth (*Sitotroga cerealella*)	This insect attacks in the post-harvest period and is very common in grain storage facilities, especially right after harvest. It reaches a size of 12 to 14 mm, and the larvae feed and transform inside the grains.	Like the grain beetle, this is a pest that attacks all major grains, including wheat, barley, corn, sorghum, and millet; it also causes great damage to paddy rice, and can cause substantial damage to its germ	It attacks ripening grains while still in the field and is usually transported inside them to storage facilities. After incubation, the larva penetrates the grain and completes its development. development. Infestations produce a lot of heat and moisture, which	

			promote the proliferation of fungi, as well as secondary pests.	
Bean weevil (*Callosobruchus maculatus*)	This is a brownish-red beetle of the dry bean weevil family. Although it is essentially a field pest, the eggs and larvae are transported inside the grains after harvest to the warehouse.	Legumes such as beans, soybeans, chickpeas, and string beans are susceptible to attacks by borers in general and bean weevil in particular. This weevil is also an important pest that infests cereal feed, animal meal, flours, and milling residues with high protein content.	The bean weevil generally attacks dry legumes. Infestation can begin in the field where eggs are laid in pods in the process of ripening. In the larval stage, the damage can affect 90% of stored legume grains. The infestation cycle can be broken by crop rotation, to avoid growing the same species in the same area for consecutive years.	

SECONDARY PESTS				
Brown beetle (*Tribolium* spp.)	Found in major tropical and subtropical regions. It is a reddish-brown beetle and the larvae are whitish-yellow.	It attacks corn, peanuts, rice, beans, chickpeas, sorghum, and wheat. It prefers damaged grains, but it can also attack whole wheat grains.	Both the adult beetle and the larvae feed first on the germ and then on the endosperm. This pest spreads usually in storage conditions with uncontrolled temperature and humidity levels, which are conducive to the proliferation of insects that increase the temperature of the grain mass.	
Flour moth (*Ephestia* spp.)	This insect is common in stored products and storage facilities in various climates. The upper half of the front is bronze, silver, or dark gray, and the upper half of the rear is gray with a yellowish tint and a black band at the point where between the two parts.	It attacks all types of dry grains, such as corn, rice, and wheat.	The larva feeds externally on grains, but most damage is caused by contamination with massive amounts of silk threads expelled by the larva, which also accumulates feces, films, and eggshells. accumulates feces, films, and eggshells.	

Termites (*Macrotermes* sp.)	This is a common name for the numerous species of social insects that can cause damage to stored grains and wooden structures such as furniture or wood-covered parts of buildings.	They feed mainly on cellulose. These insects attack various crops such as corn, sorghum, sugarcane, forest plantations, among others. They attack corn crops after sowing, destroying them before germination and causing failures in this process. The roots of corn and sorghum can be attacked, causing the plants to turn yellow, wither, and die.	They are very large because they affect not only the stored product, but also the storage infrastructure itself. Although termites do not specifically seek out grain (they only eat the grain they find in their path), they can seriously damage storage structures built with grass, branches/twigs, wood, or mud, which can collapse and result in significant losses.	

5.5.10 Integrated Pest Management (IPM) for insect control in storage units

IPM considers all available insect pest control techniques, which are combined to reduce pest development and attack. IPM reinforces the application of healthy techniques with the least possible damage to agroecosystems and encourages natural insect pest control techniques.

Pest control may include the use of predators, parasites, sterile male insects, or generating diseases in insects. Pheromones are also used for pest monitoring, to interrupt mating, or as traps.

The wide availability of insecticides often results in their excessive use and dependence on them, detracting from the importance of other pest control and management techniques, such as:

- **Pest management during pre-storage**

Pest control in storage facilities begins when the crop is still in the field. To reduce the risk of transporting primary pests from the field to storage, it is necessary to adopt certain procedures, such as grain drying and quality control, among others.

- **Cleaning and drying**

Try to clean and dry the grains whenever they come out of the fields, especially when they have to be stored for a long period.

- **Quality control of grain to be stored**

Grains must be stored in good quality and sanitary conditions, avoiding those that are infested, mixed (with other species), or damaged.

- **Storage management**

Pest development and control should be monitored based on the location of storage units, the storage period, and the quality of the stored products.

- **Cultivation of resistant varieties**

The use of resistant varieties generally delays infestation and damage to grains, prolonging the period during which the level of damage remains low.
Corn varieties straw and cover the entire ear, providing good protection against weevils. The use of a particular variety needs to be properly analyzed,

as high-yielding varieties are more susceptible to damage by insect pests in storage units.

- **Natural insecticides**

Natural insecticides include materials such as abrasive mineral dusts, natural desiccants such as wood ash, plant materials with repellent or insecticidal properties, such as parts of the Indian neem tree (*Azadirachta indica*), or vegetable cooking oils (peanut or coconut palm oil).

6 CHARACTERIZATION OF ENVIRONMENT AFFECTED BY THE PROJECT

6.1 GENERAL CONSIDERATIONS

This chapter presents a description of the current environmental and social situation in the study area.

The purpose of characterizing the baseline situation is to obtain an adequate information base for assessing the environmental and social impacts caused by the Project.

The following points present the analyses of the project's area of influence and the characterization of the baseline situation for Climate, Geology and Geomorphology, Soils and Land Use, Surface and Groundwater Resources, Flora and Fauna, Landscape, Air Quality, Sound Environment, Socio-economic, Infrastructure, Land Use Planning, Historical and Cultural Heritage, and Waste.

6.2 DEFINITION OF THE PROJECT'S AREA OF INFLUENCE

The delimitation of the areas of influence of the project is the result of the territorial spatialization of the direct and indirect impacts resulting from its implementation and operation, considering the physical, biotic, and socioeconomic environments.

They are defined as follows:

- **Directly Affected Area (ADA)** - the Directly Affected Area (ADA) is considered to be the area of the project, including its support structures, private access roads, expanded or renovated, as well as all other unit operations associated exclusively with the project's infrastructure, i.e., for the private use of the project.

- **Directly Affected Area (DAA):** area subject to the direct impacts of the preparation and operation stages of the unit where the agricultural infrastructure (silos) will be installed. Its delimitation is based on the social, economic, physical, and biological characteristics of the systems to be studied and the particularities of the project.
- **Indirect Area of Influence (IAI):** the area that is actually or potentially threatened by the indirect impacts of the preparation and operation of the project where the

agricultural infrastructure (silos) will be installed, covering the ecosystems and socioeconomic system that may be impacted by changes occurring in the AID.

- **Regional Area of Influence (RAI):** refers to the geographical space and socioeconomic sectors that are directly or indirectly affected by the planning and management activities of the agricultural infrastructure (silos) project. This concept is fundamental to understanding the scope of the policies implemented and to ensuring an integrated and efficient approach.

The definition of geographical boundaries under the influence of a given activity is one of the requirements for assessing environmental impacts and is a determining factor for the other activities necessary for preparing the environmental diagnosis and prognosis.

The delimitation of study areas is related to the identification of spaces subject to the influences of potential impacts associated with a project that modifies the environment. As a result, the task of delimiting these areas requires preliminary knowledge of the type and nature of the planned project, in order to identify the actions that significantly affect the physical, biotic, socioeconomic, and cultural environmental components during its implementation and operation.

Thus, the identification of the study areas guides, first, the environmental diagnosis phase, serving to delimit the scope of work of all disciplines involved in the Environmental and Social Impact Assessment (ESIA). Second, the areas studied allow for the investigation of the spatial extent of the adverse or beneficial effects associated with the project.

6.2.1 Directly Affected Area (DAA)

The Directly Affected Area (DAA) corresponds to the area that suffers the greatest intervention from the activity, considering physical, biological, socioeconomic changes, and the particularities of the activity.

The silo construction project will be located mainly in a rural inland area in the municipality of Balombo, in the province of Benguela, Angola.

6.2.2 Area of Direct Influence (ADI)

The Direct Area of Influence is the geographical area that will be affected by the impacts resulting from the project activities and corresponds to the contiguous and expanded territorial space of the ADA, and as such is likely to result in positive or negative impacts. For physical, chemical, and ecological environments, the DIA is considered. Within a radius of 500 meters, the project covers private residences to the north, planned streets and private residences to the south, and the EN 250 highway to the east and west, as illustrated in the figure below.

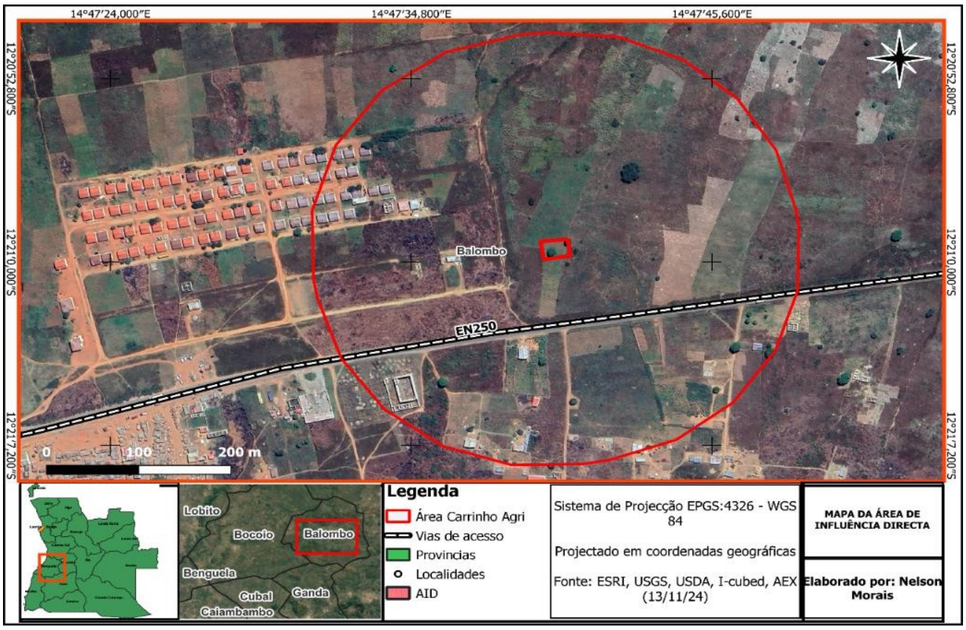


Figure 16 – Map of the direct area of influence.

6.2.3 Indirect Area of Influence (IAI)

The Area of Indirect Influence (AII) is generally a broader area where the proposed activities may have an impact, not directly, but through possible secondary effects that may result from the project.

Thus, the IIA includes the accesses to be used and, more generally, at a higher level, the area occupied by the project. Within a radius of 10 kilometers, the project covers the southwest (SW) by the Catende neighborhood and the northeast by the Cunjo neighborhood, as shown in the figure below.

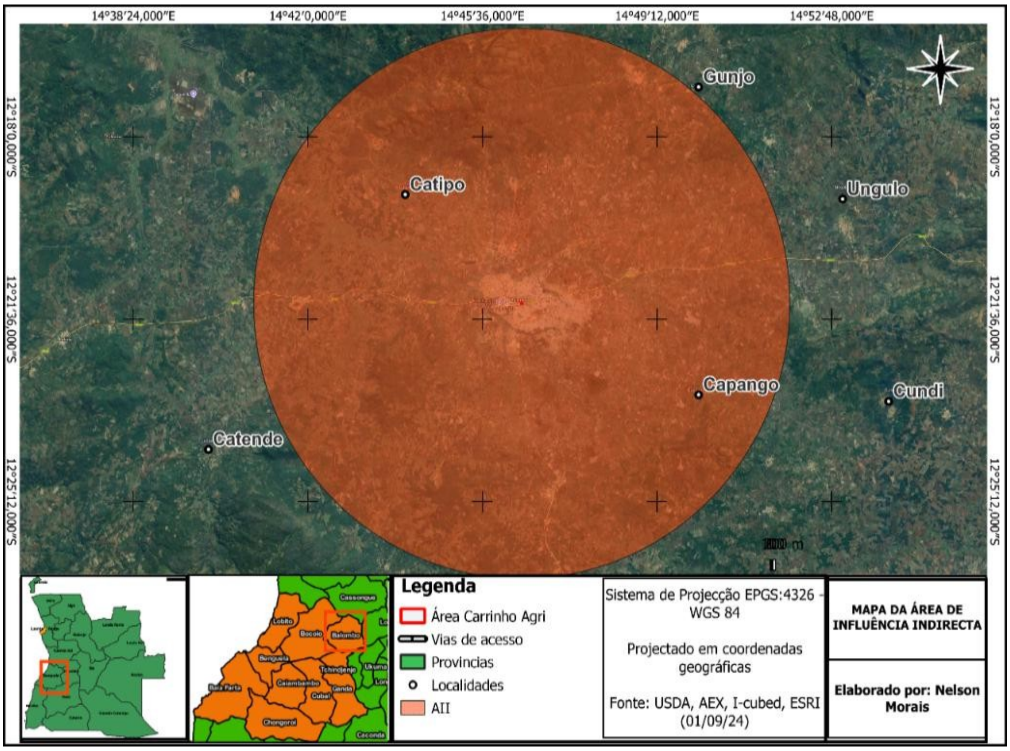


Figure 17 – Map of the area of indirect influence.

6.2.4 Regional Area of Influence (RAI)

The area of regional influence generally refers to the entire geographical area and socio-economic sectors that are directly or indirectly affected by grain storage and transport activities to and from the unit, as well as all locations that will supply this raw material, covering the entire surrounding region of Benguela Province.

6.3 CLIMATE

6.3.1 General Considerations

Angola's climate is characterized by a dry and cool season (cacimbo) from June to the end of September and a rainy season from October to the end of May (Ministry of Urbanism and Environment, 2006).

There is a clear association between rainfall in inland Angola and the southward movement of the equatorial trough from September to January, and also with its northward movement from January to May, bringing unstable tropical air with strong convergence at lower levels over much of the territory. This gives rise to very with cumulus, cumulonimbus, altocumulus, and altostratus clouds that cause rain in the form of very frequent and intense showers and thunderstorms. Local climatic factors must also be taken into account, such as the relief, which, acting in conjunction with general conditions, determines the specific characteristics of different areas.

The dry season, from May to August, corresponds to the action of the anticyclonic core of the African continent, transporting dry and stable continental air from the Kalahari over Angolan territory, with temperature inversions in the lower layers.

The average annual temperature varies between 15-20 °C in the central plateau and the Namibe desert, and between 25 °C-27 °C in the Congo River basin region and the sub-coastal strip in the north of the country (Ministry of Urban Planning and Environment, 2006).

6.3.2 Climate Classification

Köppen's climate classifications highlight the diversity of climates found in Angola.

According to the Köppen-Geiger climate classification, Angola has several types of climates, which can be distributed according to their representativeness, as illustrated in the table below.

Table 19: *Köppen* classification: territorial distribution

CLIMATE TYPE (*KÖPPEN*)	AREA (km2)	% TOTAL
Aw – Tropical rainy climate	492,660	39.5
BSh – Dry steppe climate	122,000	9.8
BSh’ – Dry steppe climate	69,500	5.6
BWh – Arid desert climate	25,840	2.1
BWh' – Dry desert climate	30,200	2.4
CWa-Mesothermal, humid climate with dry winters	374,930	30.1
CWb – Temperate climate with dry winters and hot summers	131,570	10.5
TOTAL	1,246,700	100

***Source:* (Azevedo, 1972)**

6.3.3 Characterization of the Local Climate

The climate of Benguela is characterized by arid and dry conditions typical of a desert region. Throughout the year, there is virtually no rainfall. The climate classification climate is BWh according to Köppen and Geiger. In Benguela, the average temperature is 24.1 °C. The average annual rainfall is 337 mm.

According to the data, Benguela is located near the equator, making summers difficult to define. The most popular time to visit is January, February, March, April, May, October, November, and December.

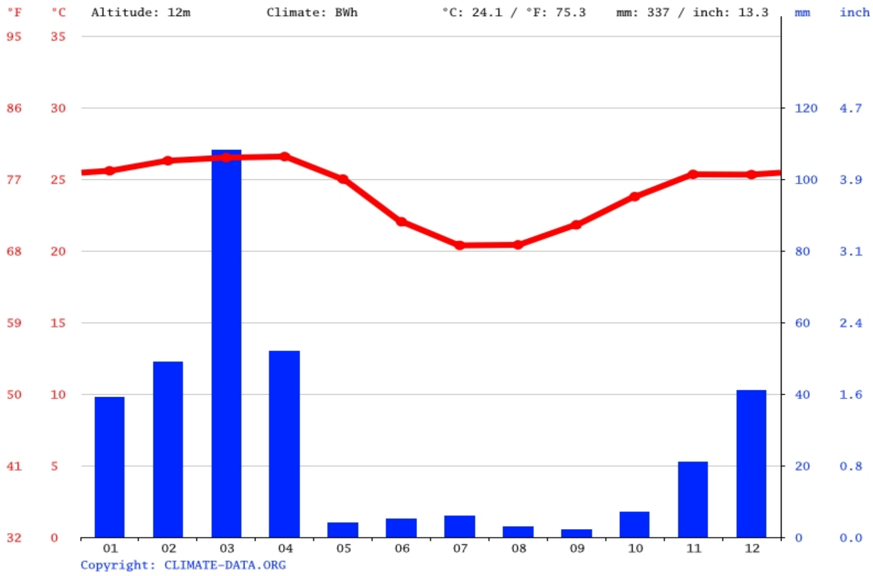


Figure 18 - Climate of Benguela

In September, precipitation drops to a mere 2 mm. This month holds the title of being exceptionally arid. The month with the highest precipitation is March, with an average of 108 mm. For climate analysis of the implementation area, the Köppen climate classification was used. The Köppen classification directly relates climate classes to natural vegetation cover, which allows for global climatological mapping, including regions where there are no meteorological observations. The Köppen system defines five main climate regions and several sub-regions. In the Köppen system, the different classes are defined based on the annual cycle of average monthly temperatures. The definition of sub-regions, in turn, uses the annual cycle of precipitation and monthly temperature.

In this context, according to Köppen, the municipality of Balombo has a humid subtropical climate, which covers the project area, as shown in the figure below.

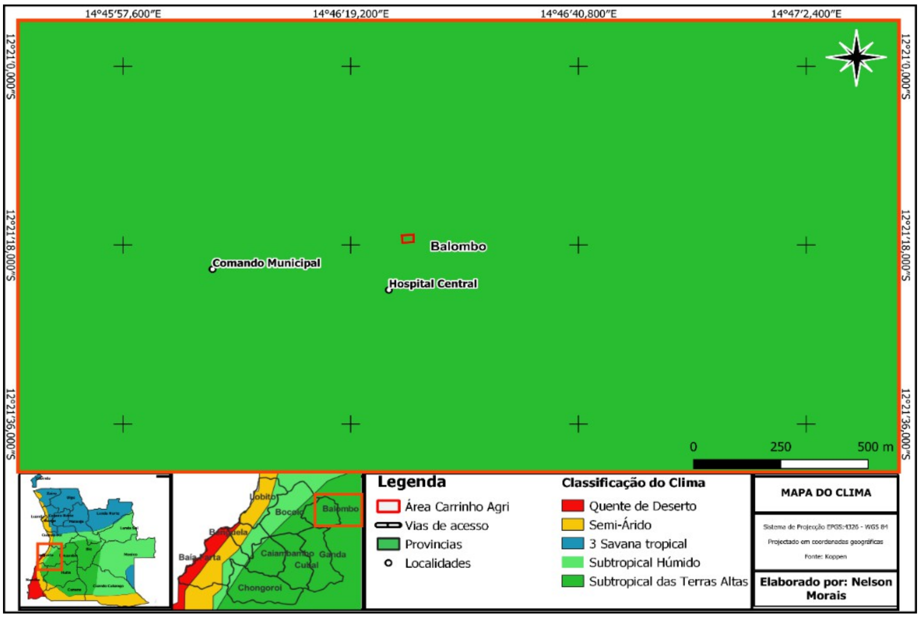


Figure 19 – Climate map.

6.3.4 Temperature

The spatial distribution of air temperature in a region is essentially conditioned by local physiographic factors, which are generally associated with aspects such as relief (altitude and exposure), soil type and cover, proximity to large bodies of water, and wind patterns.

As is characteristic of tropical climates, the months of July and August correspond to the extreme maximum temperatures, and the months of December, January, and February correspond to the extreme minimum temperatures.

The project is located in a region with an average annual temperature of 16°C-18°C. The hottest month of the year is March and the coldest month is July, with an average temperature of 19°C.

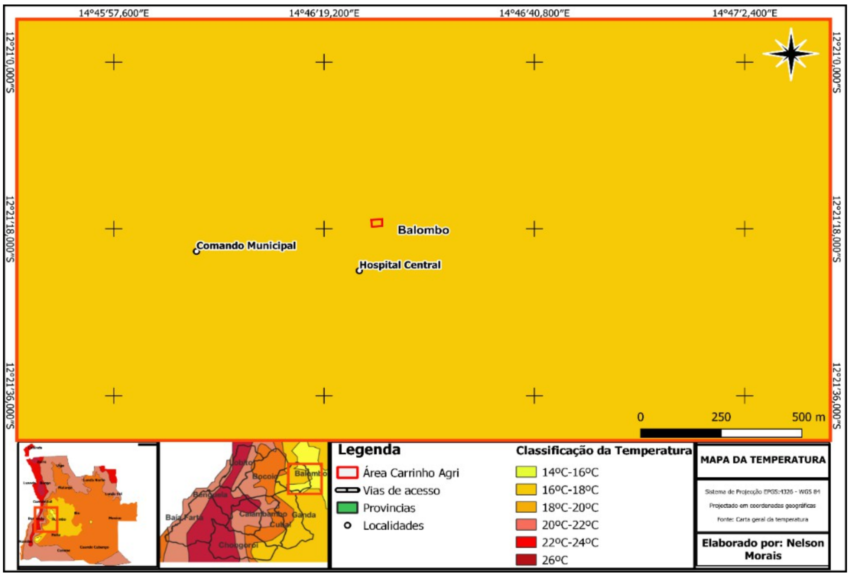


Figure 20 – Temperature map.

6.3.5 Precipitation

Precipitation is the amount of water transferred from the atmosphere to the Earth in liquid or solid form as rain, drizzle, snow, hail, or sleet, per unit area of a horizontal surface, during a given period of time. It is expressed in mm.

The project area has an average annual precipitation of 1000 mm – 1250 mm. In terms of monthly precipitation, the month with the highest precipitation is April, with an average of 159 mm, and the dry months are June, July, and August, with 0 mm of precipitation. The variation between the highest and lowest precipitation throughout the year is 159 mm (figure below).

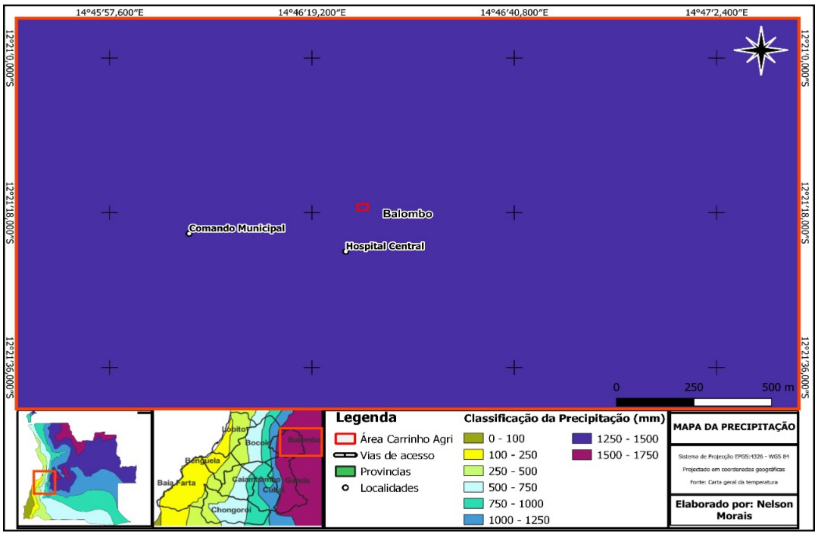


Figure 21 – Precipitation map.

6.3.6 Evaporation and Evapotranspiration

Evaporation is represented in mm, corresponding to the height of water that evaporates from an open tub exposed to the air. Average annual evaporation varies over a given period of time. Evaporation affects local evapotranspiration, which manifests itself through the transfer of water stored in the soil or in water sources to the atmosphere through vaporization and transpiration from plants and water present in the soil.

Evapotranspiration is characterized by two different concepts: actual evapotranspiration – total water loss through evaporation from the soil and transpiration from plants; potential evapotranspiration – maximum water loss from soil with uniform green vegetation cover and assuming a uniform saturation stage.

6.3.7 Cloud cover

Cloud cover is defined as the fraction of the open sky covered by clouds. Cloud cover is expressed in tenths (by whole numbers from 0 to 10). With 0 representing clear skies and 10 representing completely overcast skies

The number of days with clear skies is lower than the number of days with completely cloudy skies. Except for the summer months and October, when the number of cloudy days is lower than the number of days without cloud cover, all other months have more cloudy days than clear days.

Benguela has **dry periods in May, June, July, and August**. **The rainiest months are October and November.** November and February end up being the months with the highest rainfall.

6.4 GEOLOGY AND GEOMORPHOLOGY

6.4.1 General considerations

The purpose of this descriptor is to present the geological and geomorphological context of the area where the Balombo grain silos are located.

The analysis in this descriptor is based on a field survey of the site, carried out in August 2024.

6.4.2 Geological Framework

The geological framework of the AID was established based on available cartography (Geological Map of Angola at a scale of 1:1,000,000, Sheet 3), photographic records of the terrain, and bibliographic research.

The geology of Angola can generally be divided into sedimentary rocks (usually easily resistant and "soft") and crystalline rocks (usually difficult).

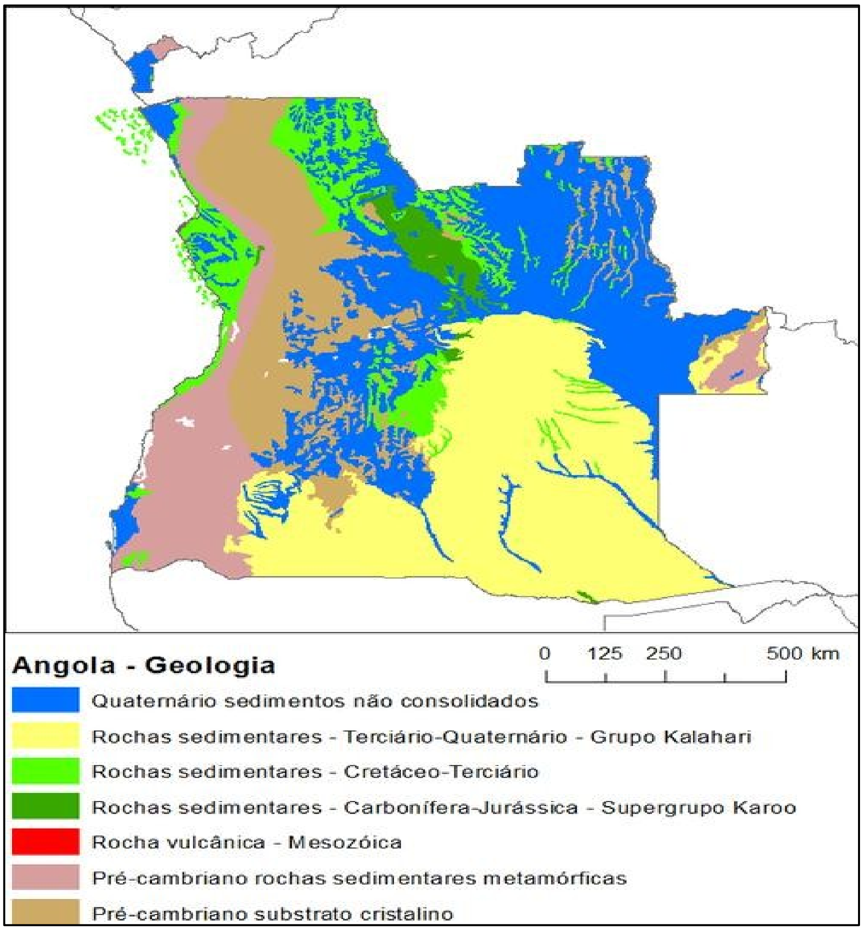


Figure 22 - Geological map of Angola

The municipality of Balombo is geologically located in the Angola Shield of the Angolan platform and has formations ranging from the Archean to the Phanerozoic. The Lower Archean was subdivided into two groups: Lower and Upper. The Lower Group includes rocks consisting of pyroxene plagioclases, amphibolites, eclogites, cordierite and sillimanite gneisses, quartzites, ferruginous quartzites, as well as associated plagiomigmatites, enderbites, and charnoquites.

Based on the Geological Map of Angola, the project area covers the Upper Archaic Formation.

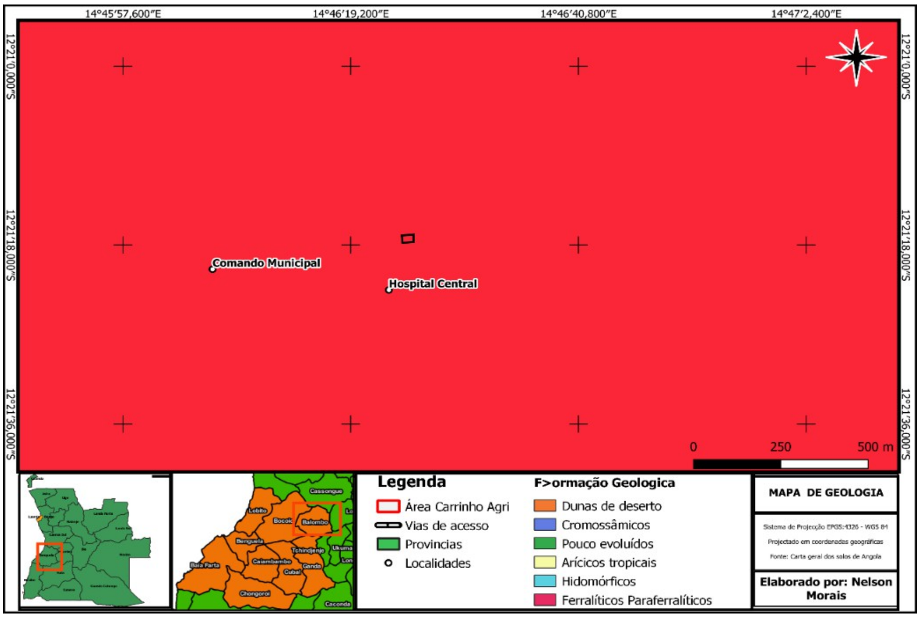


Figure 23 – Geological map.

6.4.3 Geomorphological context

According to Diniz (1998), in Angolan territory it is possible to consider 11 geomorphological units.

Figure 24 – Main geomorphological units of Angola (according to Diniz)

1. ***Coastal Strip.*** Encompassing the platform that runs almost continuously along the coast at average altitudes of 150 m to 250 m, reaching three hundred meters or more at some points in the interior periphery, gently sloping down to the coast where it ends, for most of its length, in a sea cliff with drops of around 100 to 150 m. The discontinuity of the platform is due solely to the action of rivers that have carved out wide, deep valleys where extensive river plains are formed.
2. ***Subplateau*** Belt**.** An intermediate surface marking the transition to the plateau interior, stretching from north to south at average altitudes between 400 and 600 m, from which frequent residual landforms rise, from hill islands, protruding platforms delimited by escarpments, steps or dismantled forms, and even mountain ranges, whose names sometimes reach altitudes of 1000 m.
3. ***Marginal Mountain or Marginal Mountain Range.*** Marking the western limit of the Angolan interior plateau, it corresponds to a mountainous range of residual levels, whose tops, still somewhat impressive, reach 2100-2200 m, with the highest point at Morro do Môco, at an altitude of 2620 m.
4. ***Ancient Plateau.*** An extensive plateau reaching an altitude of 1,750-1,800 m, forming a line that defines very gentle slopes on either side, stretching for hundreds of kilometers and through which rivers meander in very wide valleys, almost at the level of flattening. The monotony of the peneplain is only interrupted by the altiplanic platforms and frequent island hills that are residual relics of other older peneplains.
5. ***Lower Cunene.*** A flattened or gently undulating surface that, in the continuity of the Old Plateau, slopes from 1,400 m to 1,000/1,100 m at the southern border, with the main watercourses converging on the interior basin of Etocha Pan, except for the Cunene, which, thanks to its capture in Ruacaná, has diverted to the Atlantic. Largely filled with recent sediments, the surface is generally poorly drained, with part of the water retained in a multitude of small inland basins.
6. ***Upper Cuanza.*** The upper Cuanza basin stands out on the inland plateau, at average altitudes of 1200 to 1500 m, as it corresponds to a hydrographic network.

very slow drainage, giving rise, during the rainy season, to large flooded areas that remain so for many months.

7. ***Malange Plateau***. A flat or gently undulating plateau at medium altitude (1,200 to 1,250 m), which separates the Cuango river system to the east from the rivers of the Atlantic slope on the opposite side, while the Lucala, an important tributary of the Cuanza, running along the top of the plateau, plunges down a spectacular drop of over a hundred meters in height to the lower sub-plateau surface (Calandula Falls).
8. ***Zaire plateau.*** Extensive sandy surface that slopes sharply northward, from average altitudes of 1,200 m along its edge to 500 m in Cuango, deeply dissected by deep, roughly parallel valleys, all of which flow into the Zaire basin as they converge on its tributary, the Cassai.
9. ***Cassange Lowlands.*** An area that is several hundred meters lower than the surrounding plateau, its boundary largely defined by a steep escarpment. On the other hand, the spectacular residual reliefs that rise from the flatness are nothing more than scattered remnants of the primitive plateau peneplain.
10. ***Zambezi-Cubango peneplain.*** Extensive sandy surface encompassing the Zambezi and Cubango basins, both of which are part of the same peneplain, which slopes gently southward (1,200/1,300 m – 1,000 m), where the rivers, defining very open valleys, are drawn, so to speak, at the level of the flatness, circulating very slowly in winding beds, in addition to interspersing, at times, extensive areas of difficult drainage, where the waters are retained for extended periods.
11. ***Upper Zambezi Massif.*** A geomorphological unit distinguished by its integration into the Calunda mountain massif, which is notable not for the differences in altitude between the flat area (1,150 m) and the highest points (around 1,612 m), which are relatively modest, but rather because it rises majestically on the horizon, after almost a thousand kilometers of flatness without any other orographic feature breaking the monotony of the landscape.

6.4.4 Local Geomorphology

From a geological point of view, the municipality is characterized by Proterozoic eruptive rocks, with medium and acidic composition. The dominant soils have variable fertility, which decreases as one moves inland, especially in the easternmost area, dominated by plateau formations. Alluvial soils are quite heterogeneous, with fine textures predominating in the lowlands of the rivers to the south, while medium and coarse textures predominate. In the alluvial lowlands, the agricultural soil is reduced to thin layers of fine materials, interspersed with others of coarse texture or even unproductive patches.

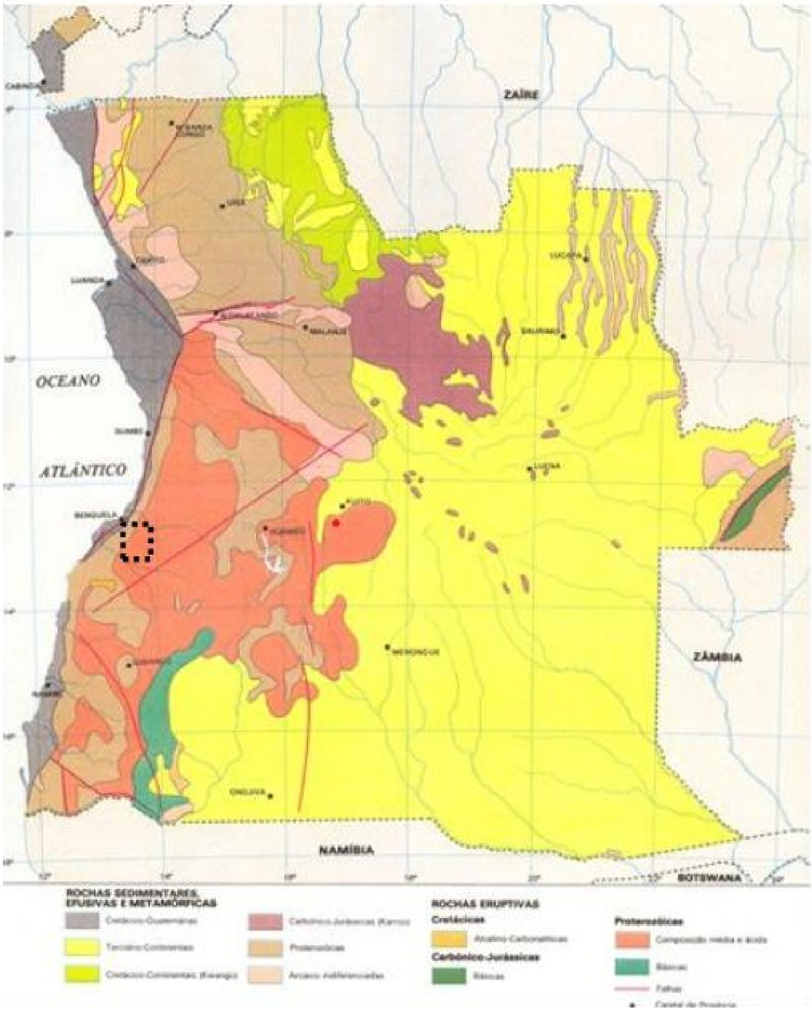


Figure 25 - Geomorphology map

The regional geomorphology of the unit is relatively flat, as it is located in a transition zone. In terms of altitude, it is characterized by 1250 meters, with the lowest area and 1560 meters is the highest area. The project area is located at an altitude of 1270-1390, with the lowest point represented by water.

There are some shallow surface water lines, which are located some distance from the project implementation area.

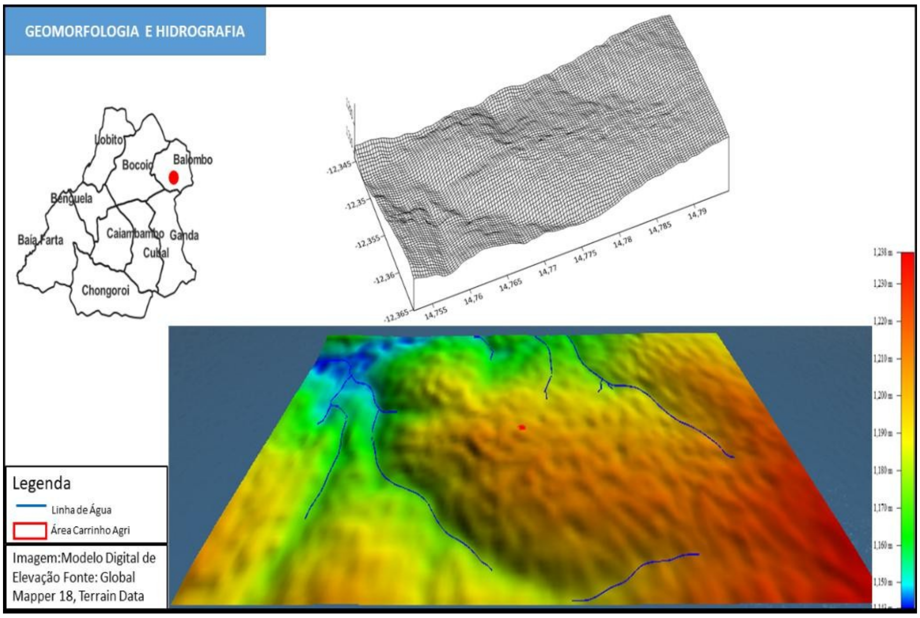


Figure 26 – Geomorphology and hydrography map.

6.5 SOILS AND LAND USE

6.5.1 General Considerations

The purpose of this descriptor is to characterize the soil at the site where the grain silo project will be implemented, hereinafter referred to as the study area.

The analysis of this descriptor was based on a field survey of the site, carried out in August 2024.

6.5.2 Soil Characterization

Angola's soils are characterized by a high percentage (around 50%) of soils that are constantly or periodically subject to erosion processes.

Soil erosion in Angola causes a total loss of soil of around 20 million tons per year, equivalent to the loss of the possibility of feeding 50,000 people per year. According to the same source, the amount of plant nutrients lost annually is around 1,200,000 tons of organic matter, 60,000 tons of nitrogen, 4,500 tons of potassium, and

500 metric tons of phosphorus. Soil erosion causes the denudation of mountains and hilltops, reduces soil depth and alters its structure, and decreases organic matter in the soil, thereby reducing water retention capacity with consequent nutrient silting and associated soil acidification. Rainfall often causes serious erosion and subsequent sedimentation of soil in streams and rivers, which eventually flow into the Indian and Atlantic oceans (Source: UNDP-AngolaLDCSIDS-SLM-draft of November 12, 2007-PORTUGUESA).

In dry regions with a desert climate, soils are generally very thin and infertile. In large sedimentary basins, climatic conditions of precipitation and temperature, and the lithology of the materials, are conducive to the development of thick soils.

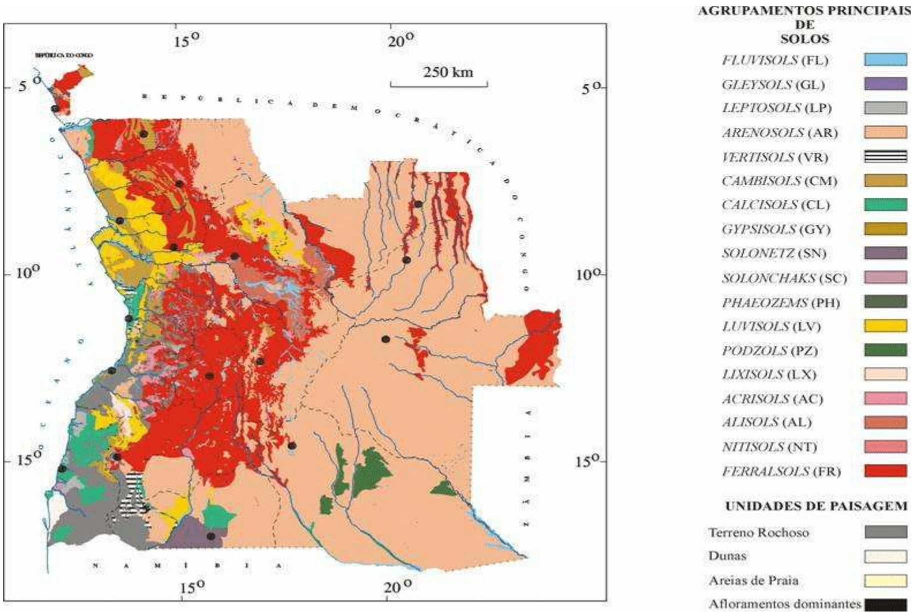


Figure 27 - Generalized soil map of Angola

6.5.3 Characterization of local soil

Soil is the surface layer of the earth's crust and is a complex mixture of mineral and organic matter resulting from the decomposition of rocks by physical, chemical, or biological agents that give rise to the mineral components of the soil.

The province of Benguela has a diversity of soil types that reflect its complex geology and climate. Soil characterization is essential to understand its suitability for agriculture, construction, and other uses.

The fertility of these soils has been declining due to increased agricultural activity in recent years. The destruction of vegetation cover due to intense burning, short fallow periods, and the existence of some intensive agriculture also contribute to the loss of fertility.

The predominant soils in the project implementation area are Ferralitic Paraferralitic, as can be seen in the figure below.

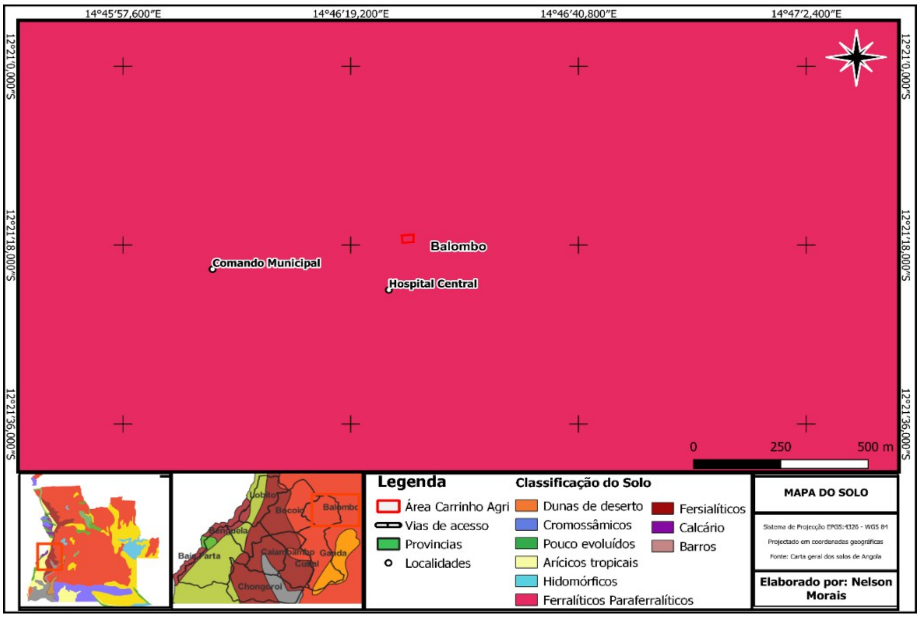


Figure 28 – Soil map.

6.6 SURFACE AND GROUNDWATER RESOURCES

6.6.1 General considerations

The purpose of this descriptor is to identify and characterize the water resources existing in the area where the grain silo project is being implemented and its surroundings.

6.6.2 Surface Water Resources

Angola has significant water potential, consisting of a dense hydrographic network directly related to the relief of the territory, as most of it descends from the plateau and mountainous areas to the lower regions.

The average surface water availability at the national level is 4,598 m3/s, equivalent to an annual mass of 145,002 Hm3. This represents an average annual surface runoff of
116,300 m3/km2 of Angolan territory and 11,809 m3/inhabitant.

Angolan territory has 77 river basins, 47 of which are main basins and the rest are coastal basins that form the following five main drainage areas:

- Atlantic Slope (40.1% of the country's total area): Chiloango, Zaire or Congo, Bengo, Kwanza, Queve or Cuvo, Catumbela, Cunene rivers, among others;
- Zaire Basin (23.2% of the country's total area), which includes most of the rivers in northern Angola, such as the Cuango, Cassai and their tributaries, Cuilo, Cambo, Lui, Tchicapa, Luachimo, among others;
- Etosha-Pan watershed – Namibia (4.5% of the country's total area);
- Kalahari Basin (12.5% of the country's total area): has many intermittent rivers, notably the Cubango River, which flows into the Okavango swamp (Botswana) and has the Cuchi and Cuito as its main tributaries;
- Zambezi Watershed (19.7% of the country's total area), which includes the rivers of the east and tributaries of the Zambezi, such as the Luena, Lungué–Bungo, and Cuando, which flows into the Zambezi via the Chobe River.

The following is a list of river basins ordered according to their drainage areas:

Table 20: River basins and their respective areas

BASIN	AREA (KM^2)	BASIN	AREA (KM^2)
1-Zaire	285,206	6-Cunene	92,400
2-Cubango	156,122	7-Central West	89,496
3-Cuanza	152,520	8-Southwest	84,327
4-Zambezi	148,377	9-Northwest Angola	76,732
5-Cuando	96,360	10-Cuvelai	52,158

Angola river basins:

Figure 29 - Angola's river basins

6.6.3 Local hydrography

In hydrological terms, the study area falls within the Atlantic watershed. The province is drained by several watercourses that extend across six large basins, whose main rivers are the Cubal-Quicombo, Balombo, Cubal do Lumbo, Catumbela (the largest river and largest provincial basin), Cavaco (the largest river and basin entirely within Benguela) and Coporolo. There are also the micro-basins of the Eval, Cuula, Cucumba, Nhime, Lua, Equimina, Calongolo, Lucipo, and Catara rivers. All basins flow from east to west.

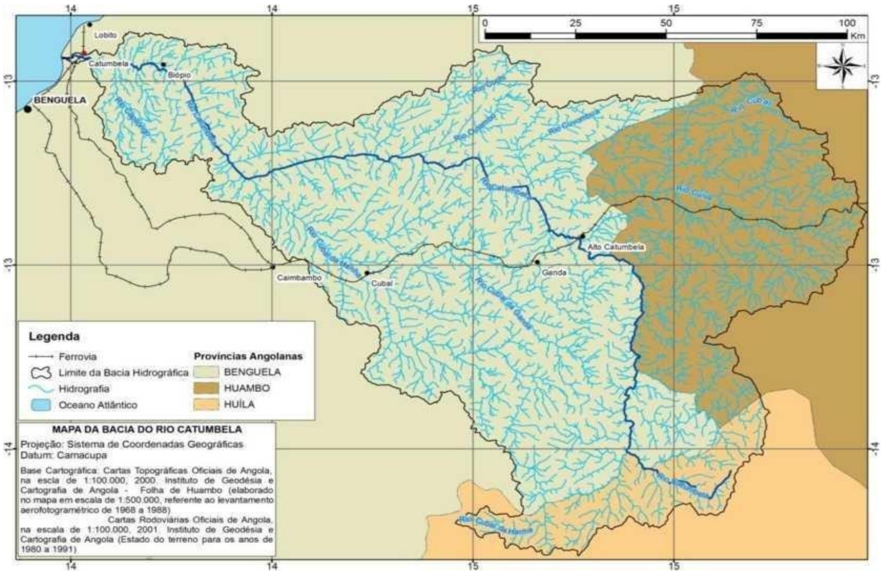


Figure 30 - Map of the Catumbela River basin (Source: IGCA 2001)

The river closest to the project site is the Cahata River, which is approximately 600 m from the project site.

Figure 31 - Cahata River

6.7 GROUNDWATER RESOURCES

6.7.1 Hydrogeological Context

According to FAO data, groundwater availability in Angola is estimated at around 58 km³/year, of which 95% directly feeds rivers, with the remaining 5% flowing into the sea (www.fao.org, 2010).

Angola's groundwater resources are located in coastal aquifers, with an average depth of 5 to 30 m; in aquifers in the central plateau region, with an average depth of between 10 and 30 m; and in aquifers in the semi-arid regions of the south and southeast, with average depths of 200 m or more (Ministry of Urban Planning and Environment, 2006).

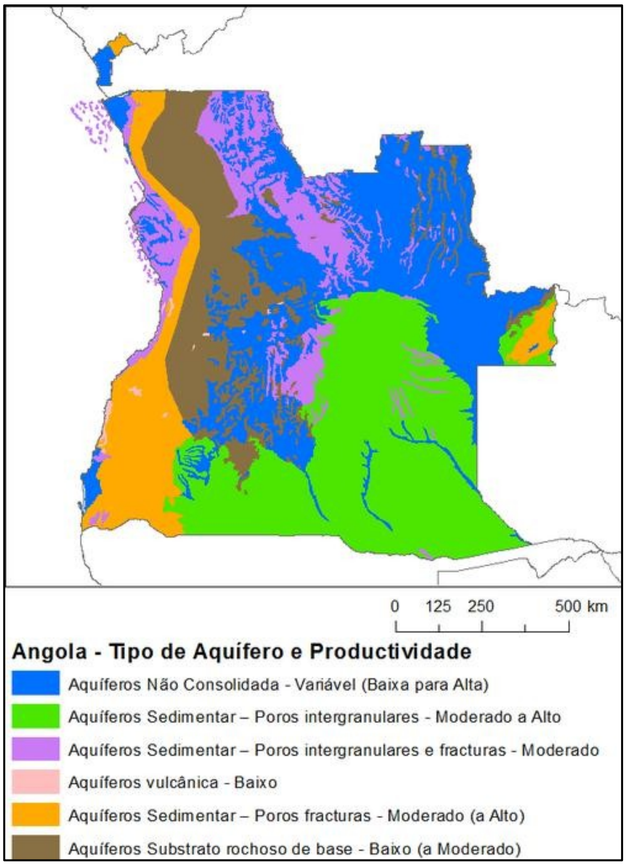


Figure 32 - Type of aquifers and productivity

As for groundwater, the system is estimated to be very productive, with existing wells between 8 and 11 meters deep.

6.7.2 Vulnerability

The vulnerability of geological formations to pollution is intrinsically linked to their lithological composition, morphology, permeability, depth of the aquifer zone, fracturing, among other characteristics.

In general, the table below shows the vulnerability indicators according to geological formation and lithological or morphological compositions.

Table 21: Aquifer vulnerability classes

AQUIFER	VULNERABILITY TO POLLUTION	INDICATOR
Aquifer in highly karstified carbonate rocks	High	V1
Aquifer in carbonate rocks with medium to high karstification high	Medium to High	V2
Aquifer in unconsolidated sediments with hydraulic connection hydraulic connection to surface water	High	V3
Aquifer in unconsolidated sediments without hydraulic connection to surface water	Average	V4
Aquifer in carbonate rocks	Medium to Low	V5
Aquifer in fractured rock	Low and variable	V6
Aquifer in consolidated sediments	Low	V7
No aquifers	Very low	V8

Due to the probable existence of an aquifer at the site with a water connection to surface waters, the degree of vulnerability is estimated to be high (V3).

6.8 FLORA AND FAUNA

6.8.1 General Considerations

Biodiversity is crucially important to the human species, since approximately 40% of the world economy and 80% of people's needs depend on biological resources.

The Convention on Biological Diversity (CBD) and the Basic Environment Law (Law 5/98) define biodiversity or biological diversity as the variability among living organisms of all origins, including those in terrestrial, marine, and aquatic ecosystems, as well as the ecological complexes of which they are part. It encompasses diversity within species, between species, and of ecosystems.

Biological diversity is of crucial importance to the human species, since approximately 40% of the world economy and 80% of people's needs depend on biological resources.

Angola therefore has a rich and varied heritage of flora and fauna, both in quantitative and qualitative terms, which, if exploited sustainably, can form the basis for the country's economic, social, and environmental development.

In addition to its enormous scientific, spiritual, and cultural value, biodiversity offers undeniable advantages for maintaining human well-being and ensuring health and food security, combating disease, economic growth, and providing livelihoods, among other aspects.

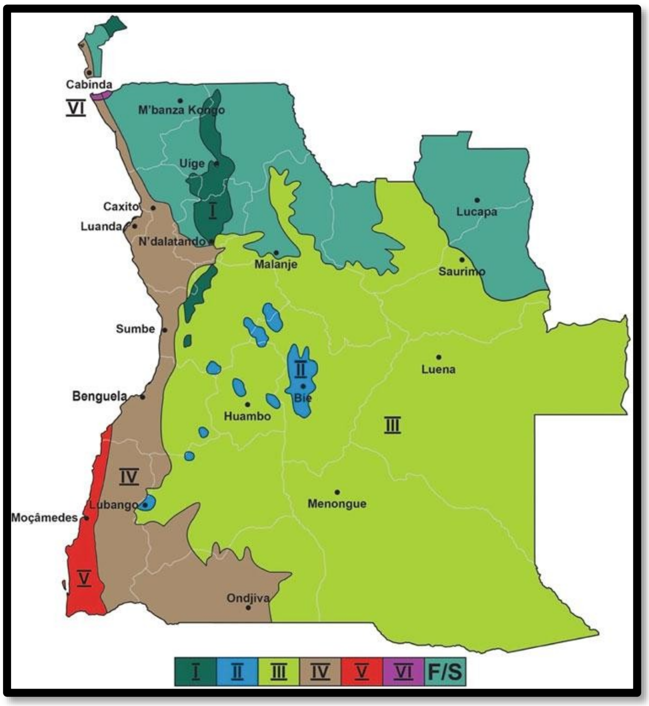
The cataloging of species that make up a given environment is essential for assessing the risks of environmental impacts in a certain area of the country, in order to ensure a balance between human activities and the natural environment, since biodiversity (fauna and flora) plays a fundamental role that is of great importance not only for the maintenance of life, but also for the socioeconomic development of the country.

From an ecological point of view, species are the living components of ecosystems and are responsible for producing oxygen (in the case of plants and algae), maintaining water and air quality, producing and maintaining soil fertility, mitigating floods, pollinating plants, and providing food, among other services.

Economically, species have direct and indirect value, generating income and employment for the local, national, and international communities of the country, thus contributing to social and economic development.

Angola has an extraordinarily wide range of biomes and ecosystems, associated with the diversity of climates and physiography of the territory. In total**,** there are seven (7) **biomes** and fifteen (15) **ecoregions,** making Angola the African country with the highest number of biomes and the second with the highest number of ecoregions.

Angola's biomes and mosaics comprise the following zones: Guinean-Congolese tropical forest (I); Afromontane forests and grasslands (II); Mesic savanna (III); Arid savanna (IV); Desert (V); Mangroves (VI) and Guinean-Congolese tropical forest/mesic savanna transition mosaic (VII) (Figure 1) (HUNTLEY, 2023).



Biomes of Angola

I - Guinean-Congolese rainforest

II - Afro-montane forests and grasslands

III - Mesic savanna

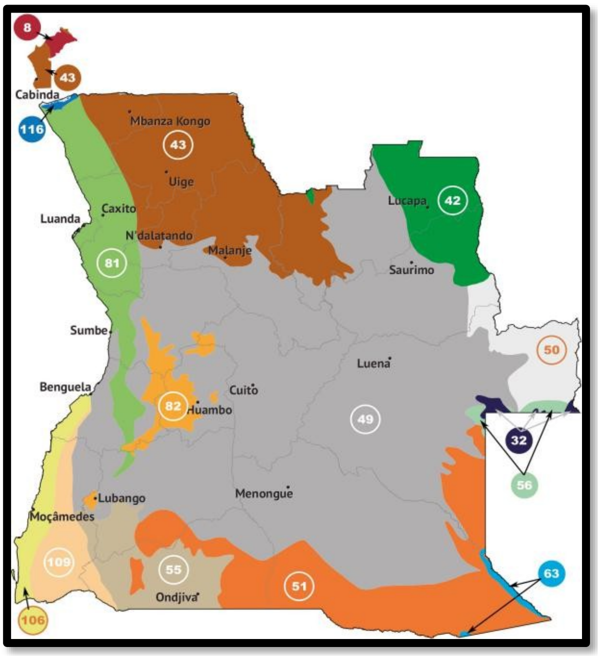
IV - Arid savanna

V - Desert

VI - Mangroves

VII - Guinean-Congolese tropical forest/mesic savanna transition mosaic

Figure 33 - Biomes of Angola | Source: HUNTLEY (2023)



Ecoregions of Angola
(According to Burgess *et al.*, 2004)

8 - Atlantic Equatorial Coastal Forest

32 - Dry *Cryptosepalum* Zambeziana Forest

42 - Southern Congolese Forest-Savanna Mosaic

43 - Western Congolese Forest-Savanna Mosaic

49 - Angolan Miombo Woodland

50 - Central Zambezian Miombo Woodland

51 - *Baikiaea* Zambeziana Forest

55 - Angola Mopane Forest

56 - Western Zambezi Grassland

63 - Zambezi Flooded Grasslands

81 - Angola Escarpment Savanna and Forest

82 - Angolan Mountain Forest-Grassland Mosaic

106 - Kaokoveld Desert

109 - Namibian Escarpment Forests

116 Central African Mangroves.

Figure 34 - Ecoregions of Angola | Source: HUNTLEY (2023)

6.8.2 Methodology

The collection of primary information focused on the project's Area of Direct Influence (ADI). Reconnaissance visits were carried out during July and August 2024, with the aim of conducting a survey of the flora and fauna during 8.6 hours of sampling.

The collection of secondary information (literature review) was directed at a much larger area, covering all areas of the project. One of the main objectives of the bibliographic information search was to compile a list of potential species in the study area. Information provided by *the International Union for Conservation of Nature* (IUCN), the phytogeographic map of Angola, the description of biomes for Angola provided by *the World Wide Fund for Nature* (WWF), the Red List of Angola, and the List of species included in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), as well as other sources cited in this section. The potential list was supplemented by information collected in the field.

In terms of flora and fauna characterization, particular emphasis was placed on the potential presence of species that are most relevant in terms of nature conservation and biodiversity, i.e., those that are classified as threatened according to the IUCN and/or that are included in the categories of the Red List of Species of Angola, under the terms of Executive Decree No. 258/18. In this context, particular attention was also paid to any habitats with which these species may be associated.

Biotic information was sampled mainly based on the method of active search observation in potential habitats (GODOI *et al*., 2019), although all supplementary information obtained was recorded, namely between trips to and from the study area and between sampling sites.

Secondary and primary information was further supplemented by conducting questionnaires with the population on the flora and fauna of the study area.

The specific methodological details relating to the sampling of flora, vegetation, and fauna are described below:

6.8.3 Flora and vegetation

The composition and description of the vegetation in the study area was based on direct *in situ* observation, data provided by the phytogeographic map of Angola, and information on Angola's ecoregions provided by the WWF.

Sampling of flora and vegetation was carried out mainly using the transect method. The transects were covered in a zigzag pattern, identifying the species present. Specimens or population centers of note, such as invasive species or possible endangered species, were geolocated using GPS and photographed.

The vegetation units present were recorded along the transects, including the start and end points of the patch, if relevant, as well as the main species present. The floristic surveys focused on the different vegetation units identified. The results of these surveys were subjected to a phytogeographic analysis using the Phytogeographic Map of Angola. This classification analysis allowed for the segregation of the plant formations present.

6.8.4 Characterization of the Biotic Environment of the Project Area

6.8.4.1 Biogeographic and phytosociological context

The study area is located within the mixed savanna, forest, and grassland biome, mainly in the Angolan humid miombo ecoregion. This vegetation is a mosaic of woods, savannas, and meadows with more or less continuous herbaceous cover, mainly consisting of the genera *Brachystegia*, *Julbernardia*, *Burkea*, *Guibourdia,* and *Cryptosepalum*.

A small part of the area is covered by the Afromontane forest ecoregion, which is described as threatened and has been reduced to isolated patches of forest in ravine areas where the genera *Podocarpus*, *Apodytes*, *Pittosporum*, and *Protea* predominate.

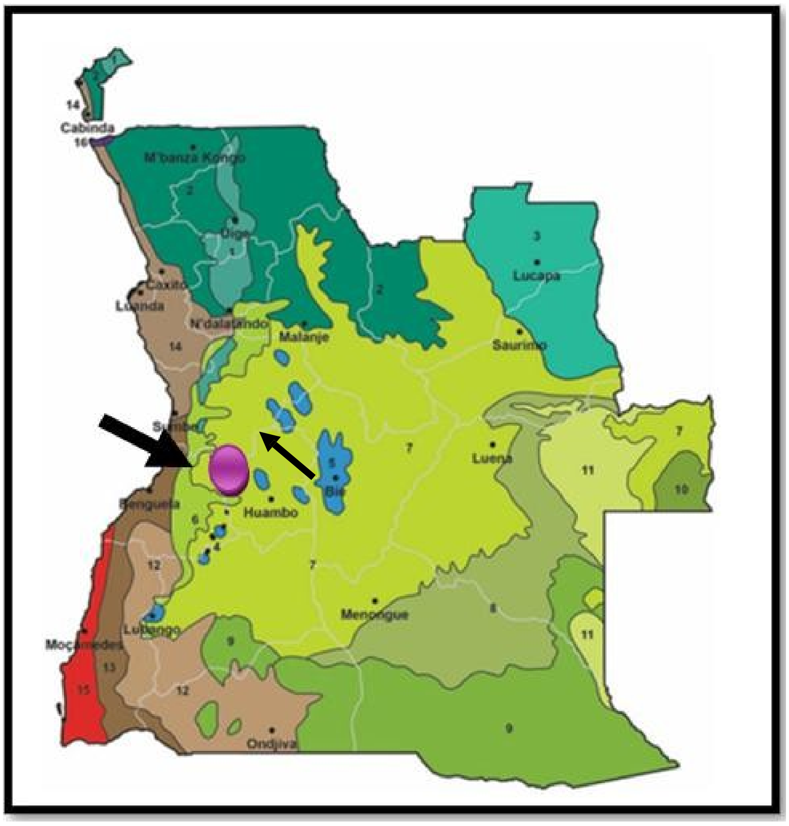


Figure 35 - Ecoregions of Angola with indication of the study area.

6.8.4.2 Characterization of flora and vegetation

Open forest vegetation in transition to tall grass savannas with cliffs and trees was observed in the study area, and the species *Dombeya quinqueseta*, *Psidium* sp., *Tylosema* sp., and *Citrus* sp. were identified.

During the field survey, the species *Tithonia diversifolia* was recorded, an exotic and invasive plant known for its ability to suppress the regeneration of native species. The presence of *Tithonia diversifolia* is particularly relevant, as this species tends to dominate disturbed ecosystems, indicating that the area may be undergoing a process of environmental degradation.

Two native species were identified, *Dombeya quinqueseta* and *Tylosema* sp, with *Dombeya quinqueseta* not listed as threatened according to IUCN conservation databases.

The following species are described for this area, in the open savanna forests: *Apodytes dimidiata, Maytenus acuminata, Nuxya congesta, Maesa lanceolata, Podocarpus latifolius*, among others.

The absence of these species in the field survey may be associated with factors such as changes in land use, environmental degradation, or even seasonal variations.

The current vegetation, composed largely of species more adapted to open and disturbed areas, seems to indicate an ecological transition, where the ideal conditions for the growth of larger tree species and denser forests may have been altered.

The vegetation in the study area may have undergone significant changes, with a predominance of species that are more resistant to degradation. Despite this, only one of the species found during the field survey has had its conservation status assessed, and it is not endangered, suggesting that environmental conditions, although impacted, still support the presence of native plant species that are not threatened. However, the presence of invasive species and the absence of vegetation described in the literature indicate a trend of degradation that may affect local biodiversity in the long term.

Figure 36 – Main species identified in the study area. *Dombeya quinqueseta* (**A**); *Tylosema sp*. (**B**); *Psidium sp*. (**C**) and *Citrus sp*. (**D**)

Table 22: **Main botanical groups in the immediate project area. LC - Least Concern, NA-Not Assessed, VU- Vulnerable, DD – Data Deficient**

COMPOSITION OF THE FLORA IN THE DIRECT PROJECT AREA - BALOMBO									
Taxonomic groups			**Species**			**Conservation status**		**Ecological behavior**	
Division	Class	Family	Scientific Name	Common name	Habit	IUCN status	National status	Exotic	Invasive
Magnoliophyta	Magnoliopsida	Asteraceae	*Tithonia diversifolia*	Mexican sunflower	Shrub	NA	NA		
Magnoliophyta	Magnoliopsida	Malvaceae	*Dombeya quinqueseta*	Tropical flowering pear tree	Shrub	LC	NA		
Magnoliophyta	Magnoliopsida	Myrtaceae	*Psidium* sp.		Tree	NA	NA		
Magnoliophyta	Magnoliopsida	Fabaceae	*Tylosema* sp.		Climbing plant	NA	NA		
Magnoliophyta	Magnoliopsida	Rutaceae	Citrus sp.		Tree	NA	NA		
Magnoliophyta	Magnoliopsida	Metteniusaceae	Apodytes dimidiata	Dakane	Tree	LC	NA		
Magnoliophyta	Magnoliopsida	Celastraceae	*Maytenus acuminata*	Sybas	Tree	LC	NA		
Magnoliophyta	Magnoliopsida	Stilbaceae	*Nuxia congesta*	Brittle wood	Tree	LC	NA	x	
Magnoliophyta	Magnoliopsida	Primulaceae	*Maesa lanceolata*	False azagaia	Tree	LC	NA	x	
Magnoliophyta	Magnoliopsida	Podocarpaceae	*Podocarpus latifolius*	True yellow	Tree	LC	NA	x	

6.8.5 Fauna

Fauna sampling in the study area was based on a bibliographic review of the fauna composition of the area and questionnaires conducted among the local population. Fauna specimens observed in the field were recorded and analyzed from the point of view of endemism and conservation status.

6.8.5.1 Characterization of fauna

Angola has a richly diverse fauna, with more than 117 amphibians, 278 reptiles, 940 birds, and 291 native mammal species.

The assessment of the fauna occurring in an area is a fundamental parameter for evaluating the impacts that projects may have on biodiversity in the short, medium, and long term.

The main faunal groups that are biological indicators for the project in question are: herpetofauna (reptiles and amphibians), avifauna (birds), and mastofauna (mammals).

6.8.5.2 Herpetofauna

Angola is a country with a very rich and endemic herpetofauna, especially in the southern region.

According to secondary surveys conducted by the study team and IUCN data, the amphibians potentially present in the project's area of influence in Angola are mainly species with wide distribution and no unfavorable conservation status, nor any status assigned by the Red List of Species of Angola. The abundance of these animals is higher during the rainy season and in wetlands, which is not the case in the project's area of influence. Therefore, a low representation of these animals in the area is expected.

As for reptiles, based on the phytogeographic representation of the area, the most common species would be snakes and lizards, with emphasis on lizard genera such as *Agama*, *Gerrhosaurus*, and *Chamaeleo*. All of these animals are not endangered, but many species are endemic to Angola, which is fundamental to the conservation of their habitat.

6.8.5.3 Avifauna

During direct surveys in the project area, it was not possible to record birds of conservation importance in the area. Indirect surveys indicate that the main birds described as occurring in the study area are mainly of the order Passeriformes (birds), with emphasis on the species *Corvus albus* (white-collared crow), *Streptopelia semitorquata* (red-eyed dove), *Uraeginthus angolensis* (blue-breasted roller), *Numida meleagris* (guinea fowl), and *Estrilda astrild* (waxbill).

These species are mainly found in open savanna fields and miombo forests, and are all classified as Least Concern (LC) by the IUCN. They are fundamental to the balance of ecosystems and serve as indicators of environmental quality.

6.8.5.4 Mastofauna

Mastofauna represents the group of mammals in an area and is one of the groups that serves as environmental indicators. Around 291 species of mammals are described for Angola, 12 of which are endemic, meaning that they are relevant groups for conservation.

No wild terrestrial mammal species were identified in all study areas during direct surveys, mainly because it is an area that is already heavily anthropized and has a large human population. Most of the mammals that occur in the area are those used for agriculture and livestock, such as cattle, pigs, and goats.

Table 23: Main fauna species in the project area: LC - Least Concern, NA - Not Assessed, NE - Not Evaluated by IUCN, Category B (AEx) - Threatened with extinction, Category C - Vulnerable, Category D - Invasive, CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora

COMPOSITION OF FAUNA IN THE DIRECT PROJECT AREA - BALOMBO								
Taxonomic groups	**Species**				**Conservation status**		**Ecological behavior**	
	Family	Scientific Name	Common name	Confirmed	IUCN status	National status	Migratory	Congregator
Avifauna	Cisticolidae	*Cisticola juncidis*	Reed Bunting		LC	NA	x	
	Corvidae	*Corvus albus*	White-bellied crow	x	LC	NA		x
	Estrildidae	*Estrilda astrild*	Waxbill	x	LC	NA		
	Ploceidae	*Euplectes hordeaceus*	Black-winged red bishop		LC	NA		
	Ploceidae	*Euplectes macroura*	Yellow-mantled Widow		LC	NA		x
	Accipitridae	*Angolan Vulture*	Angolan Palm-nut Vulture		LC	NA	x	
	Bucerotidae	*Lophoceros alboterminatus*	Brown hornbill		LC	NA		x
	Meropidae	*Merops bullockoides*	White-fronted Bee-eater	x	LC	NA		x
	Meropidae	*Merops pusillus*	Little Bee-eater	x	LC	NA		x
	Meropidae	*Merops variegatus*	Blue-breasted bee-eater		LC	NA		
	Numididae	*Numida meleagris*	Guinea fowl	x	LC	NA		x
	Lybiidae	*Pogoniulus subsulphureus*	Yellow-throated barb		LC	NA		
	Cisticolidae	*Yellow-throated Prinia*	Tawny-flanked Prinia		LC	NA		x
	Columbidae	*Red-necked Turtle Dove*	Red-eyed Dove	x	LC	NA	x	
	Estrildidae	*Angolan Greenfinch*	Blue-breasted Roller	x	LC	NA		x
	Viduidae	*Vidua macroura*	Pincushion widow	x	LC	NA		x
Herpetofauna	Agamidae	Agama agama	Common agama	x	LC	NA	x	x
	Agamidae	Agama mucosoensis	Mucous agama	x	LC	NA	x	x

	Lamprophiidae	*Boaedon* sp.	Angolan house snake	x	LC	NA	x	
	Gerrhosauridae	*Gerrhosaurus* sp.	Keeled lizard	x	LC	NA	x	x
	Pythonidae	Python sebae	African python		NT	NA	x	
Mastofauna	Pedetidae	*Pedetes capensis*	Jumping hare	x	LC	NA		x
	Bovidae	*Philantomba monticola*	Mountain goat	x	LC	NA	x	x
	Hipposideridae	*Macronycteris gigas*	Round-leaved giant bat		LC	NA		x

6.8.6 Conservation areas

The closest environmental conservation area or unit to the project zone is the Chimalavera Regional Natural Park, located approximately 210 km from the project zone.

This park is located in the province of Benguela and was established as a Special Reserve in 1971 and elevated to the status of Regional Natural Park in 1974, covering an area of 112 km².

With an altitude ranging from 50 to 265 m, Chimalavera comprises an elevated plain surrounded by mountains. There are no rivers or lakes within the reserve.

The dominant vegetation type is sublittoral steppe with some species of Acacia.

The fauna consists mainly of mountain zebra (*Equus zebra*), olongo (*Tragelaphus strepsiceros*), and springbok (*Antidorcas marsupialis*).

Given the distance of the park, the actions developed through the implementation of the project would not have a negative impact on the conservation unit, as the minimum limit for considering an impact on conservation areas is 5 km (IUCN, 2020).

6.9 LANDSCAPE

6.9.1 General considerations

The purpose of this descriptor is to characterize the landscape of the silo implementation area and its surroundings in order to determine the potential visual disturbances caused by the use of the space.

6.9.2 Landscape Units

The landscape should be understood as the visual image of the surrounding space, which always presupposes an interaction between potential observers and the observed territory.

The morphology of the territory and its occupation are the aspects that contribute most clearly and directly to the different types of landscape. These types, which include the presence of living elements, do not behave in a static manner, but vary throughout the day and, above all, throughout the year. Therefore, the landscape can be defined as a complex and dynamic system.

In addition to the factors mentioned above, *"understanding the landscape involves knowledge of factors such as climate, geology, soils, flora and fauna, ecological structure, land use, and all expressions of human activity over time, as well as understanding how they interact, constituting a multifaceted reality*." The visual expression of these interactions at a given moment constitutes the landscape that can be seen by each observer, according to their perception and specific interests (Pinto-Correia et al., 2001).

When defining the Landscape Units present in the study area, it is important to take into account the concept of Landscape and Landscape Unit.

According to (Forman, R. T and Godron, M; 1986), Landscape is understood as the global, dynamic, and evolving image of "*a heterogeneous area of territory composed of a set of interacting ecosystems that repeat themselves throughout it in a similar way*" and that is "*the result of the combination of nature, techniques, and human culture*" (Pitte, J.R. T; 1983).

A Landscape Unit is considered to be not only "*areas limited by relief or other elements, within which all points are mutually visible*," but also those in which the landscape has a certain homogeneity in terms of relief, geology, and humanization. These correspond to areas with relatively homogeneous landscape characteristics, whose interconnection creates a specific pattern that is repeated, differentiating a given unit from the surrounding area. In addition to this pattern, there should be internal coherence and a character specific to the unit, which facilitates its identification.

Unique Landscape Elements are understood to be "*elements with a small surface area, but which stand out in the landscape unit as a whole due to their difference, their intrinsic quality (or, conversely, because they create a disqualifying dissonance) and/or the impact (sensory, cultural, or ecological) they have on the unit*."

6.9.3 Landscape Characterization

To characterize the landscape, a Visual Influence Area for the project was defined, which was considered adequate for a good perception of the surroundings, taking into account the characteristics of the territory under analysis and seeking to cover the visual basin directly influenced by the existing structures, based on parameters relating to observation conditions, namely access roads, existing scenic points, and human occupation.

It is considered that the Silos Plant will be visible from the following observation points:

- National Road EN-250;
- Social housing project (Kilamba);
- Some areas of the Cahata neighborhood;

As a methodological approach for a better characterization and assessment of the landscape of the study area, landscape units were considered. These are individualized by grouping relatively homogeneous landscape features, whose interconnection creates a specific pattern that repeats itself, differentiating a given unit from the surrounding area.

Taking into account the characteristics of the project's visual impact area, namely the relief, land use, and vegetation cover, four distinct landscape units were identified and defined: UPH1-Semi-natural, UHP2-Peri-urban, UHP3-Consolidated urban, and UHP4-Social housing project (Kilamba);

Photo 1: Semi-natural area

UHP2-Peri-urban area

This UHP is characterized by residential and/or mixed use (residential, informal commerce, and infrastructure), which develops along the EN 250 and on the outskirts of the village of Balombo. It comprises a low-density agglomeration, with some degree of planning, organized along the paved road leading to the site where the agricultural infrastructure (silos) will be built.

Photo 2: Houses in the Cahata neighborhood

UHP3 Consolidated Urban Area

UHP3 comprises the consolidated urban fabric in the areas bordering and surrounding the center of the town of Balombo, which has mixed occupancy, characterized by a medium to high-density agglomeration, crossed by the paved EN-250 road network and unpaved intermediate roads. This UHP includes the administrative center of the town of Balombo.

UHP4 Social housing project (kilamba)

The 100 Houses Social Project in Balombo is part of a larger housing development initiative in the municipality. The construction of these houses aims to improve the housing supply for technicians working in the municipality, such as teachers and health professionals, etc., who, depending on the visual basin in which they are apprehended, have greater or lesser visibility.

Photograph 3: **Social housing project (Kilamba)**

6.9.4 Landscape Assessment

The characterization of the landscape included the definition of landscape units, which correspond to areas with more or less homogeneous characteristics in terms of their structural elements, their functioning, and their participation in the space (namely geology, climate, water resources, soils, vegetation, and land use).

For each landscape unit, an assessment is carried out based on an objective characterization and a subjective characterization, which results from the assessment of the following parameters:

Visual quality, which corresponds to the result of the presence of the main structural elements of the space (relief, vegetation cover, water resources, and built structures) and the dynamics between these elements;

Visual absorption, which refers to the capacity to absorb, integrate, or visually disguise human activities while maintaining its characteristics and visual quality, assessed based on its greater or lesser capacity to withstand visual impact, depending on the relief, the existence of vegetation screens, and the existence of human occupation;

Sensitivity, a parameter that indicates the degree to which a landscape is affected by the alteration/introduction of a particular external action, varies inversely with visual absorption capacity, which means that a given landscape will be more sensitive if it has high visual quality and low visual absorption capacity (integration of changes in the landscape).

Table 24: Landscape sensitivity matrix

CAPACITY FOR ABSORPTION	VISUAL QUALITY		
	High	Medium	Low
High	High	Medium	Reduced
Medium	Very high	Average	Reduced
Low	Very high	High	Average

The combination of the application of the concepts of absorption and visual quality to the Landscape Units according to the matrix for landscape sensitivity resulted in the Landscape Sensitivity classification presented in the table below.

Table 25: Characteristics of landscape units

LANDSCAPE UNITS	VISUAL QUALITY	ABSORPTION CAPACITY	LANDSCAPE SENSITIVITY
UHP1-semi-natural	High	High	High
UHP2- Peri-urban	Medium	Medium	Medium
UHP3- Consolidated urban area	Reduced	Average	Reduced
UHP4-Housing project 100 houses	Average	Average	Average

Thus, with regard to **UHP1**, its high visual quality, combined with its high absorption capacity, results in high landscape sensitivity.

UHPs, which are characterized by dominant human occupation, characterized by population clusters with more or less dense mixed occupation, have **medium landscape sensitivity**. This is the case for UHP2 and UHP4.

UHP3s have reduced visual quality, which, combined with their average visual absorption capacity, results in **reduced landscape sensitivity**.

Based on a visual analysis of the landscape, situations that represent high landscape and scenic value are identified due to their unique character, expression, and quality, and are preferred and/or valued by the user.

As visual quality is a characteristic that depends on subjective factors, its assessment is based primarily on qualitative criteria, and it is not possible to obtain an absolute estimate of this parameter.

6.10 AIR QUALITY

6.10.1 General Considerations

This descriptor was developed based on elements collected during the field visit carried out in August 2024, on the local and surrounding analysis of potential sources of air pollution, and on bibliographic research.

6.10.2 Air Characterization

The purpose of this descriptor is to characterize the air quality of the area where the silos will be installed and the surrounding area. To this end, potential sources of atmospheric emissions and sensitive receptors were identified and inventoried during a site visit in February 2024.

In the absence of an Ambient Air Quality Measurement Network, qualitative methods were used to assess air quality. Atmospheric dispersion conditions were also assessed, based on meteorological parameters that determine the transport and dispersion of pollutants and local morphological characteristics.

With the aim of providing guidelines to protect human health from harmful effects and to support national and local authorities in managing air quality, the World Health Organization (WHO) recommends guideline values for air pollutants, as shown in the table below.

Table 26: WHO recommended guideline values

POLLUTANT	EXPOSURE DURATION	GUIDELINE VALUE (MG/M3)
Carbon monoxide	15 min	100,000
	30 min	60,000
	1 hour	30,000
	8 hours	10,000
Lead	1 year	0.5
Nitrogen dioxide	1 hour	200
	1 year	40
Ozone	8 hours	100
Sulfur dioxide	10 min	500
	24 hours	20
PM10	24 hours	50 (value that should not be exceeded for more than 3 days per year)
PM2.5	24 hours	50 (value that should not be exceeded for more than 3 days per year)

Source: **(WHO, 2006)**

6.10.3 Air Quality Characterization

The main sources of pollution in the immediate vicinity of the study area are associated with atmospheric emissions. According to observations made, air quality in the study area will be mainly affected by greenhouse gases emitted by vehicles and machinery operating in the area, as well as the use of fuel-powered generators and particle emissions (dust).

In terms of sensitive receptors, the vegetation around the project area stands out as it may be affected by vehicle traffic, mainly due to the emission of particles from driving on unpaved roads. There are no other potential sensitive receptors in the vicinity of the project area, such as schools, hospitals, and recreational and leisure areas.

The atmospheric emissions characteristic of burning and fuel-powered machinery include, among other pollutants, carbon monoxide (CO), methane (CH_4), carbon dioxide (CO_2), particulate matter (PM_{10} - particles with an aerodynamic diameter <10 µm), nitrogen oxides (NO_x/NO_2), sulfur oxides (SO_x/SO_2), nitrous oxide (N_2O), non-methane volatile organic compounds (NMVOCs), heavy metals, polycyclic aromatic hydrocarbons (PAHs), dioxins and furans (PCDD+PCDF), and benzene.

Since the surveys were conducted prior to the project and the air quality data for the study area and surrounding area are not known, it is not possible to state with certainty whether the concentration of the aforementioned pollutants exceeds the WHO recommended guideline values. However, these values may be known once the environmental monitoring plan for monitoring atmospheric emissions during the different phases of the project's implementation has been implemented.

6.11 SOUND ENVIRONMENT

6.11.1 General Considerations

This descriptor was prepared based on information gathered during the field visit carried out in August 2024, on the analysis of the local area and surrounding area for potential sources of noise pollution, and on bibliographic research.

6.11.2 Noise Levels and Effects of Noise on Health

Noise is generally defined as unwanted sound, which implies a subjective classification of sound. A sound signal may have different characteristics, but it is only classified as "noise" when it is directly or indirectly correlated with adverse physiological or psychological effects in humans or is perceived negatively (as useless, intrusive, or unpleasant).

When a sound source vibrates, it causes variations in the pressure of the surrounding air, which overlap with the air pressure. Compared to air pressure (in Pascals), the variation in sound pressure is perceptible to the human ear, for an average individual with full hearing ability, in the range of 20 mPa to 100 Pa.

It is customary to express sound pressure levels in decibels (dB). A decibel is a logarithmic ratio between the measured sound pressure and the reference value. The sound pressure level scale ranges from 0 dB (hearing threshold) to 140 dB (pain threshold). The ear is most sensitive to mid-range frequencies, which is where the human voice is expressed.

In environmental acoustics, the most commonly used descriptor for assessing discomfort is the equivalent continuous sound level, LAeq, defined as the constant sound pressure level which, integrated over the analysis time interval T, has the same sound energy as the signal under analysis, varying over time, where LAp is the sound pressure level, weighted by the A-scale.

Noise pollution is now treated as atmospheric contamination through energy (mechanical or acoustic energy), causing effects throughout the body and not just on the auditory system. Noise is now considered a serious public health problem.

Continuous exposure to high noise levels can cause serious health effects that manifest themselves primarily at the physiological, psychological, and social levels. The degree of impact depends on the characteristics of the source itself, the frequency and intensity of the noise, the sensitivity of the receiver, and the duration of exposure to the noise.

Some of the most common effects of noise are psychological disturbances or physiological changes associated with *stress* and fatigue, resulting in sleep disturbances and lack of concentration.

The World Health Organization (WHO) has stipulated that the discomfort threshold for continuous noise should be below 50-55 dB(A) LAeq day. At night, to avoid sleep disturbances, ambient noise should not exceed 30 dB(A) LAeq night.

Table 27: Exposure limit values (ELVs)

	LEX, 8h db (A)	LCpeak db (C)
Limit Values	87	140
Upper action level	85	137
Lower action level	80	135

6.11.3 Characterization of the Acoustic Reference Framework

The main sources of noise in the immediate vicinity of the study area are associated with road traffic on access roads, generator use, workers, and other instruments used in the execution of the works.

As mentioned above, the WHO has stipulated that the nuisance threshold for continuous noise is 50 dB (A) at the daytime LAeq level. At night, noise levels should be between 5 dB and 10 dB below daytime values to ensure a balanced sound environment.

As mentioned above, the characterization of the reference acoustic framework included the identification of noise emission sources and sensitive receivers in the study area.

Table 28: Details of the noise measurement survey

Reference of equipment used	**Pulsar Model 33**	
Height of equipment above ground	1.5 m	
Measurement interval	23-140 db	
Weighting	A	
Measurement duration	10 minutes	
Atmospheric conditions: Equipment: **Testo 410-2**	Humidity	39
	Temperature	28.5 ºC
	Wind speed	2.5 m/s
	Clear skies	Cloudy
Equipment positioning surface	Dirt	

Table 29: Results obtained

Measured parameters	Results	Location	Coordinates
LAeq	67.3 db	Agri-Balombo Cart	12°21'16.98"S, 14°46'25.12"E
L95	65.4 db		
L50	67.2 db		
L5	69.0 db		
Lcpeak	92.5 db		

Figure 37 – Noise measurement at the site

The sound levels obtained are 67.3 dB, which does not exceed the noise limit recommended by the WHO for mixed areas, since it is intermittent during the daytime, corresponding to noise levels when noisy activities are observed. The continuous noise annoyance threshold (LAeq) may be sporadically exceeded during the daytime when machinery, vehicles, and/or other equipment that may cause noise are in use, estimated to be above 70 dB(A).

6.12 SOCIOECONOMICS

6.12.1 General Considerations

This descriptor was prepared based on information gathered during the field visit in August 2024, the local and regional analysis of the surroundings, potential socioeconomic development factors, and bibliographic research.

The socioeconomic characterization of the study area aims to identify and characterize the main demographic, economic, and social aspects that may be influenced by the development of the grain silo project and, thus, highlight the potential direct and indirect impacts associated with it.

6.12.2 Administrative Framework

The province of Benguela has its headquarters in the city of Benguela, Angola's second largest city. It was founded in 1615. The province covers an area of 39,826 km² and has approximately 2.6 million inhabitants, with a population density of approximately 67.1 inhabitants per km². It is estimated that 68.6% of the population is concentrated in the coastal municipalities of Benguela, Lobito, and Baía-Farta, with Lobito and Benguela being the most populous municipalities.

The province of Benguela is bordered to the north by the province of Cuanza Sul, to the east by the province of Huambo, to the southeast by the province of Huíla, to the southwest by the province of Namibe, and to the west by the Atlantic Ocean. Administratively, it is divided into nine municipalities, as shown in the figure below.

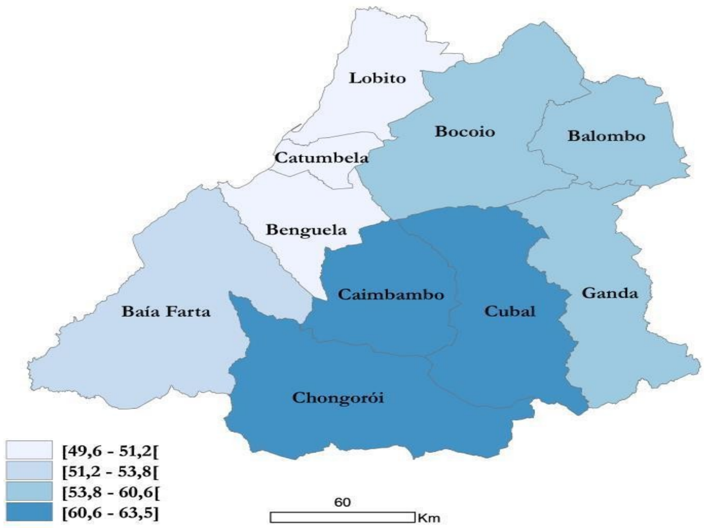


Figure 38 - Administrative division of Benguela

6.12.3 Demographics and population

According to the Final Results of the 2014 Census, the population of Benguela on the census date, May 16, 2014, was 2,231,385 people. Sixty-four percent live in urban areas and 36% in rural areas.

Table 30: Population by area of residence, by sex, 2014

Província e área de residência	Total		Homens		Mulheres	
	Nº	%	Nº	%	Nº	%
Benguela	**2 231 385**	**100**	**1 055 819**	**100**	**1 175 566**	**100**
Urbana	1 427 990	64,0	678 067	64,2	749 923	63,8
Rural	803 395	36,0	377 752	35,8	425 643	36,2

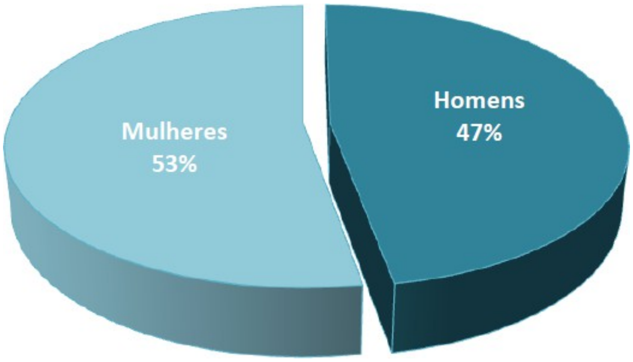
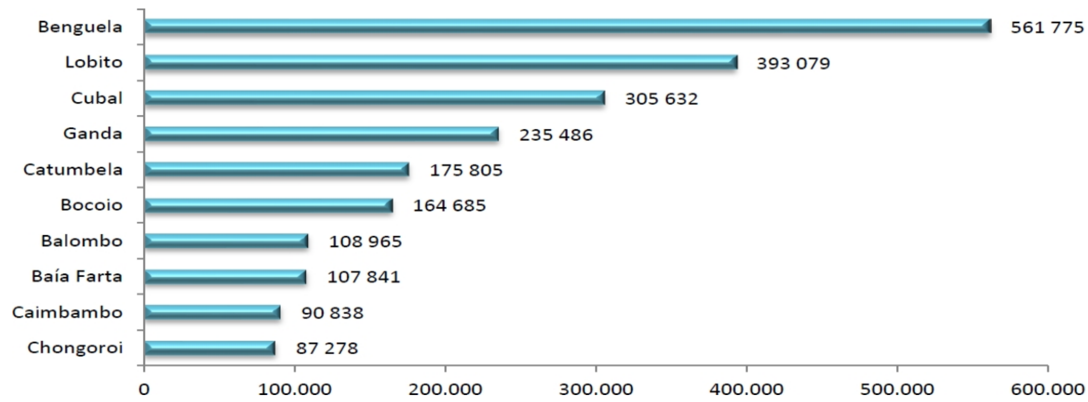


Figure 39 - Population, by sex, 20

Among the resident population, 1,175,566 are women, corresponding to 53% of the total, while the male population is 1,055,819, representing 47% of the total resident population.

The municipality of Benguela is the most populous with 561,775 people, representing about a quarter of the province's population (25%). With less than 100,000 inhabitants are the municipalities of Caimbambo (90,838 inhabitants) and Chongoroi (87,278 inhabitants).

Graph 1: Population by municipality, 2014

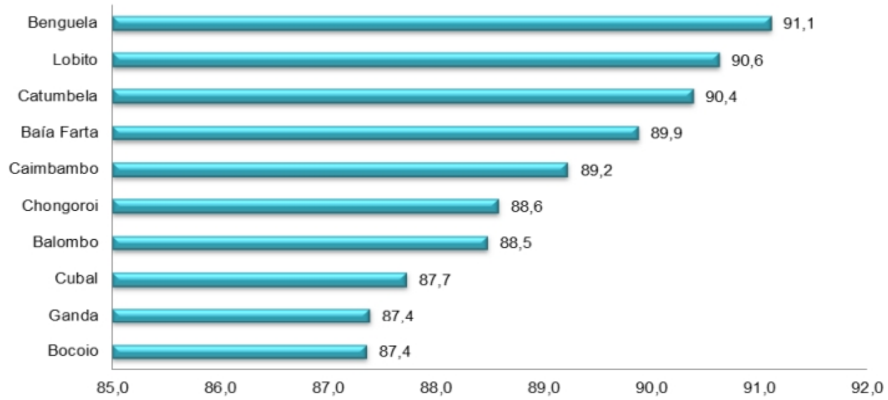


The municipality of Balombo covers an area of 2,635 km² and has a population of around 108,965. It is bordered to the north by the municipality of Cassongue, to the east by the municipality of Londuimbali, to the south by the municipalities of Ucuma, Chinjenje, and Ganda, and to the west by the municipality of Bocoio.

Administratively, the municipality consists of the commune-headquarters, corresponding to the city of Balombo, and the communes of Chindumbo, Chingongo, and Maca Mombolo.

The province's sex ratio is 89, meaning that in Benguela there are 89 men for every 100 women, which means that the population of Benguela is mostly female. The municipalities with significantly lower ratios are Bocoio and Ganda.

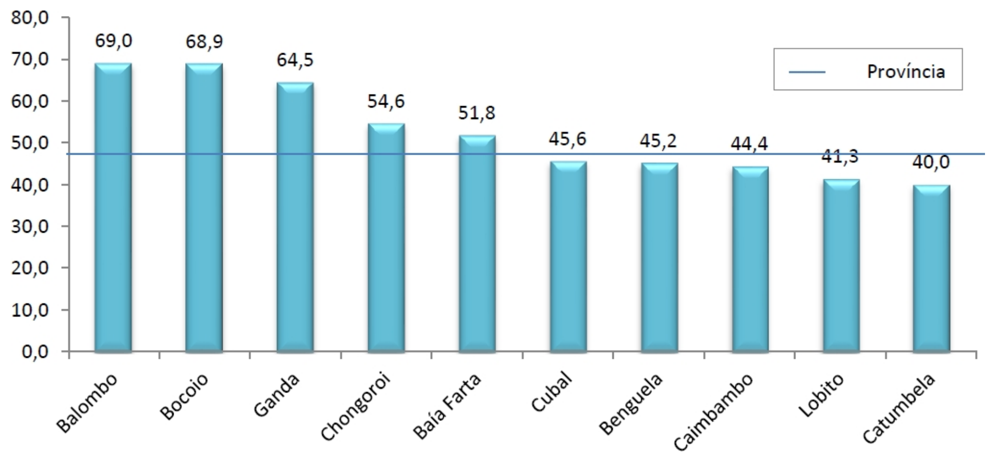
Graph 2: **Sex ratio by municipality, 2014**



6.12.4 Employment

The employment rate is the ratio of the employed population aged 15 or over to the total population aged 15 or over. This important indicator measures the capacity of a province's economy to provide employment for its growing population. In 2014, the employment rate in Benguela province was 49%.

Chart 3: Employment rate by municipality, 2014



The unemployment rate in Angola rose to 32.4% in the first quarter of 2024, with young people being the hardest hit by unemployment, which affects 63.5% of young people between the ages of 15 and 24. According to data from the Angolan National Statistics Institute (INE), the unemployment rate among the population aged 15 to 24 rose by 9.1% in the first three months of 2024 compared to the previous quarter (58.3%), while the unemployment rate among the population over 15 years of age saw a less significant increase in quarterly terms (from 31.9% to 32.4%). In the first quarter of this year, an additional 181,368 Angolans aged 15 or over (working-age population) became unemployed, for a total of 5,646,659 people (a quarterly change of 3.3%).

Among Angolans aged 15 to 24, the unemployed population increased to
3,737,150 people, with an additional 286,183 young people unemployed. Within the working-age population (17,414,877), 11,768,218 people were employed, with an estimated employment rate of 60.2%, which was slightly higher in rural areas and among the male population (61.6% compared to 59% for women).

The 35-44 and 45-54 age groups account for the largest number of employed people, from according to the Survey on Employment in Angola (IEA). Almost half of the people (47.5%) work in agriculture, hunting, and fishing, followed by trade with 22.6%. Most employed people (79.8%) are in the informal sector, of which 70.7% are men and 88.5% are women.

The IEA is a sample survey of households residing in Angola. Each quarter, a total of 10,944 households are selected, 6,036 in urban areas and 4,908 in rural areas.

In Balombo, a large part of the working population is involved in the informal sector, working in activities such as street vending, subsistence farming, small family businesses, and manual labor, where the lack of regulation and social security is a constant. Although the informal sector helps sustain the local economy, it does not offer many opportunities for improving quality of life or developing professional skills.

To combat unemployment, it is essential to create formal employment opportunities, encourage entrepreneurship and investing in professional training. Improving local infrastructure,
the development of sectors such as industry and tourism, and the encouragement of new business investment are important steps toward reducing unemployment and promoting sustainable economic growth. In addition, the promotion of professional training and technical education programs can increase job prospects and reduce inequalities in the labor market.

6.12.5 Economic activities

6.12.5.1 Agriculture

In 2014, 48% of households in Benguela province were engaged in some form of agricultural activity.

Table 31: Households engaged in agriculture. 2014

Província	Nº	%
Benguela	**232 339**	**48,0**

The province of Benguela has high agricultural potential (historically proven), resulting from a unique soil structure and favorable climatic diversity, combined with an enviable hydrographic network. The province has around one million hectares of arable land, which reflects the potential for agricultural development in this area.

The province offers favorable conditions for the development of an impressive variety of crops.

Chart 4: Households, by type of agricultural activities practiced, 2014

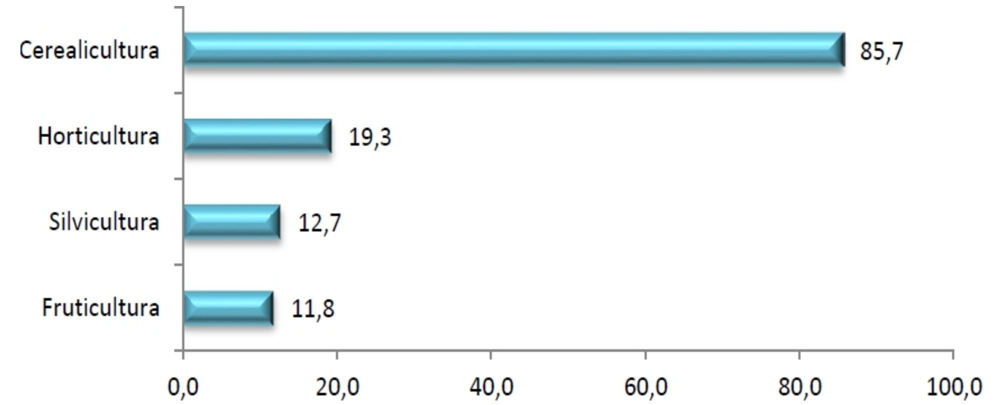
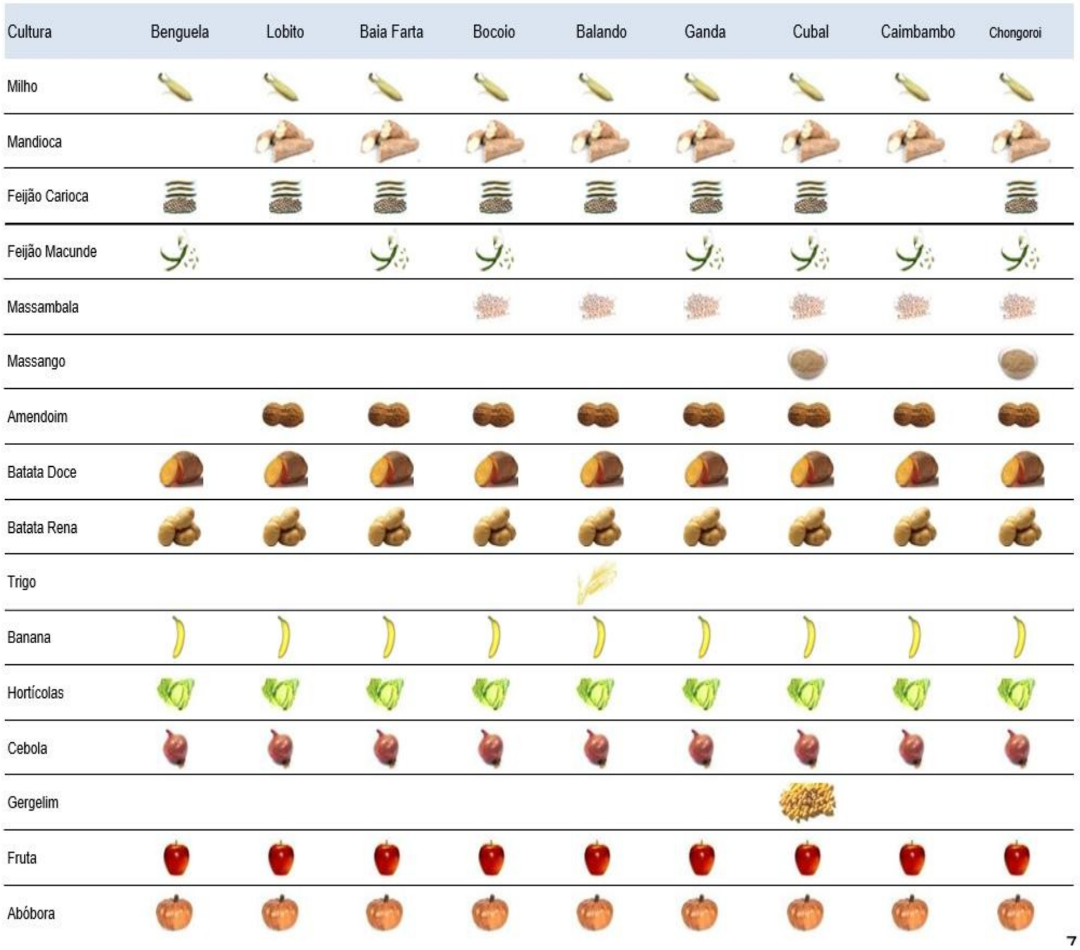


Table 32: Type of crops planted in different municipalities



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These crops are grown according to a cropping system that can be summarized according to the growing season.

With regard to agricultural practices, FAO data systematize the prevailing situation in Benguela province as follows.

Table 33: Agricultural practices

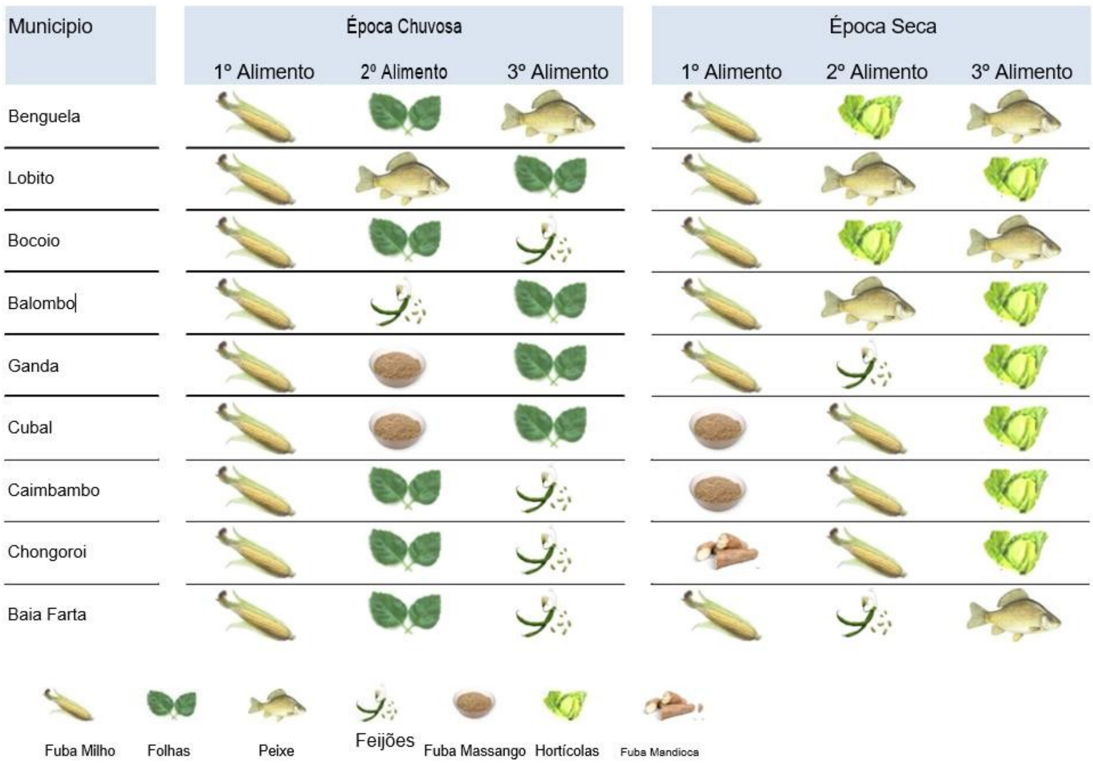
Provincia	Área Cultivada por Familia	Área Cultivada com Tracção Animal	Fertilizante	Rotação
Benguela	3 'ha	5 'ha	Orgânicos	Anual
Lobito	2 'ha	6 'ha	Estrume	Anual
Baia Farta	2 'ha	3 'ha	Adubos Verdes	Anual
Bocoio	1,5 'ha	4 'ha	Adubos Verdes	Anual
Balando	1,5 'ha	2,5 'ha	Adubos Verdes	Pousio
Ganda	1,5 'ha	3 'ha	Estrume	Pousio
Cubal	1 'ha	3 'ha	Estrume	Nenhuma
Caimbambo	2,5 'ha	4 'ha	Estrume	Anual
Chongoroi	1,5 'ha	3 'ha	Estrume	Pousio

Área Cultivada por Familia — Área Cultivada com Tracção Animal — Fertilizantes — Rotação

Source: AIP market study - Benguela Province (2010)

Corn is the staple food in the province, combined with vegetables, cornmeal, and fish.

Table 34: Staple foods in the province



Source: AIP-Benguela Province market study (2010)

The agricultural sector in Balombo plays a key role in the local economy, being one of the main sources of livelihood for the rural population. Agriculture in the region is mainly characterized by the production of food for domestic consumption, with emphasis on corn, beans, sweet potatoes, cassava, massambala, and vegetables, which are the main staples of the local population's diet. In addition, the region also grows fruits such as bananas, mangoes, etc.

Irrigation and the use of traditional farming techniques still predominate in many areas due to a lack of access to advanced technologies and resources for mechanization. This limits productivity and the expansion of commercial agriculture in the region. However, some initiatives have been implemented to improve agricultural efficiency, including projects to support local producers, focusing on training and providing inputs to increase production.

Despite these challenges, the agricultural sector in Balombo is considered a major source of employment and income, with many farmers depending directly on production for their survival.

survival. The development of the agricultural sector in the region is vital to ensuring food security, improving the living conditions of the population, and fostering local economic growth. However, overcoming obstacles such as water scarcity, transportation infrastructure, and lack of technical assistance are issues that need to be addressed to ensure the sustainable growth of the sector.

6.12.5.2 Livestock

Livestock farming is a key sector for the subsistence of Angola's rural population and is strategically important for the economy and food and nutritional security of the population through the production and trade of animals and their products. Animal production plays a major role in the socioeconomic life of our country, not only because of the percentage of the population engaged in this activity, but mainly because of the resources it provides.

Livestock farming in the country focuses mainly on information about the agricultural and aquaculture enterprises that practice this activity, whose data is limited to the structure of the farms that raise animals, the species raised, their numbers and classes, production systems, animal vaccination, and animal health status, among other things. The RAPP (Agricultural and Fisheries Census) found that there are 773 specialized companies in the country that practice livestock farming as their main activity and 2,341 that practice livestock farming as at least one of the company's activities.

The main livestock species raised by Agricultural and Aquaculture Enterprises are cattle, goats, pigs, sheep, and poultry, particularly chickens. The results show that the number of animals in the EEs is 259,640 cattle, 136,216 goats, 69,846 pigs, and 58,951 sheep.

The table below illustrates the data on livestock numbers according to the main species raised in Angola.

Table 35: Livestock numbers by EE per province

PAÍS/PROVINCIA	BOVINOS	CAPRINOS	OVINOS	SUÍNOS
Angola	**259 640**	**136 216**	**58 951**	**69 846**
Cabinda	1 092	551	439	1 229
Zaire	1 173	2 101	640	2 814
Uige	12 623	5 386	4 598	7 423
Luanda	16 701	16 102	14 710	8 528
Cuanza Norte	13 444	4 877	2 197	1 811
Cuanza Sul	30 663	22 937	10 042	21 921
Malanje	9 633	4 518	1 504	2 558
Lunda Norte	19 370	5 089	1 489	1 577
Benguela	35 077	16 267	5 634	4 189
Huambo	10 441	10 894	4 382	6 715
Bie	4 087	4 305	1 460	1 125
Moxico	913	1 644	78	534
Cuando Cubango	968	506	60	80
Namibe	30 907	10 031	2 144	856
Huila	33 385	8 938	1 671	828
Cunene	25 178	11 705	1 764	916
Lunda Sul	6 342	3 985	1 304	1 965
Bengo	7 643	6 380	4 835	4 777

Fonte : INE-RAPP 2019-2020

Table 36: Poultry stocks raised by EEs by province (continued)

PAÍS/PROVÍNCIAS	GALINHAS		FRANGAS DE CORTE		FRANGAS POEDEIRAS		PATOS		PERUS	
	TOTAL	MÉDIA	TOTAL	MÉDIA	TOTAL	MÉDIA	TOTAL	MÉDIA	TOTAL	MÉDIA
Angola	**60 986**	**1 799**	**104 254**	**11 043**	**551 219**	**51 529**	**12 796**	**659**	**544**	**114**
Cabinda	115	12,8	7 042	320,1	1 069	213,8	567	31,5	2	2
Zaire	313	39,1	1 739	82,8	404	33,7	251	17,9		
Uige	2 355	84,1	162	23,1	5 033	2516,5	329	20,6		
Luanda	9 253	298,5	17 157	2451	99 627	9057	2 020	91,8	27	4,5
Cuanza Norte	656	46,9	894	81,3	13 576	969,7	242	22	5	2,5
Cuanza Sul	1 356	30,8	23 552	305,9	52 581	1877,9	1 443	23,3	233	14,6
Malanje	5 583	164,2	2 055	158,1	13 487	749,3	241	13,4	21	5,3
Lunda Norte	11 765	273,6	442	88,4	80	40	2 107	84,3		0
Benguela	991	17,7	11 272	150,3	71 305	5485	944	15,7	39	5,6
Huambo	7 991	44,9	253	28,1	57 143	5714,3	1 027	18,7	34	3,8
Bie	3 313	77	3 661	114,4	29 493	3277	207	13,8	10	3,3
Moxico	4 495	179,8	521	57,9	10 741	1790,2	231	19,3	1	1
Cuando Cubango	151	25,2	210	42	290	41,4	47	9,4		
Namibe	2 355	181,2	280	280	6 194	2064,7	339	48,4	12	12
Huila	749	68,1	30 450	6090	39 700	7940	312	52	47	9,4
Cunene	1 531	45	78	39			124	12,4		
Lunda Sul	6 248	63,1	400	50	5 640	705	750	30	38	12,7
Bengo	1 766	147,2	4 086	681	144 856	9053,5	1 615	134,6	75	37,5

Fonte : INE-RAPP 2019-2020

As illustrated in Tables 28 and 29, livestock farming in Benguela is practiced on a large scale by the business sector. On the other hand, local communities are also involved in raising various types of animals, which is crucial for the subsistence of these communities, as well as for the economic development of the region.

The livestock sector in Balombo is fundamental to the subsistence and economy of rural communities, with an emphasis on cattle, goat, pig, and poultry farming. Farming is largely extensive and traditional, with few mechanized resources, and is mainly geared towards domestic consumption and supplying local markets.

Livestock farming in Balombo faces significant challenges, such as a lack of infrastructure and limited access to inputs and veterinary services. Despite this, the sector has great potential for growth, especially if modern farming techniques and training programs for smallholder farmers are introduced. With investments in infrastructure and technical support, livestock farming can contribute even more to income generation and economic development in the region.

6.12.5.3 Industry

The manufacturing sector suffers from poor promotion of raw material production (agriculture and livestock); insufficient coordination between central and provincial services; deficient mechanisms for promoting entrepreneurship (credit, guarantee funds, technical assistance); deficient inspection and supervision of activities; deficient institutional capacity of the Provincial Industry Directorate; insufficient qualified staff; incipient technical assistance activity; deficient means and facilities for production in quantitative and qualitative terms; low level of utilization of existing potential; poor accessibility to different regions of the province.

This sector is the least developed. Benguela has an industrial park whose developed and diversified structure is the second largest in the country. However, it is currently operating at less than 20% of its installed capacity. In the heavy industry group, there are 16 companies with the capacity to produce 25 types of goods and/or products and provide services in the naval, machine tool construction, metallurgical, and chemical fields. Twenty-seven companies are currently inactive.

Light industry – there are 44 companies in textiles, clothing, tanneries, footwear, tobacco, electronics, and construction. Only five production facilities are currently active.

Food industry – there are 31 companies in the sugar, fishing, pasta, vegetable oils, preserves, and various beverages sectors. Only five are operating regularly, particularly in the fishing sector.

Heavy Industry – Of the fourteen (14) existing production facilities, only seven (7) are operational. Eight (8) production facilities are at a standstill.

There are also more than 500 small businesses, including bakeries and pastry shops, mills, carpentry and joinery workshops, construction companies, wholesale and retail businesses, shoe shops, and auto repair shops, each employing between 5 and 40 people. **Source:** https://www.aipex.gov.ao/PortalAIPEX/#!/angola/hu%C3%ADla

The industrial sector in Balombo is still in its development phase, with an emphasis on small industries focused mainly on the processing of agricultural products and handicrafts. The main industrial activities include the production of corn flour, bean processing, and the manufacture of vegetable oils, as well as small food and beverage factories. The timber industry is also one of the areas with the greatest potential, taking advantage of the region's natural resources.

Despite its potential, the industrial sector faces significant challenges, such as a lack of adequate infrastructure, a shortage of skilled labor, and difficulties with electricity supply and transportation. The region still relies heavily on agriculture and fishing, and local industries are unable to fully meet the population's demand.

However, Balombo has great potential for industrial growth, especially in the areas of agribusiness and natural resource processing. With investments in infrastructure and training, the sector can expand, generating employment and contributing to the region's economic development, becoming an important pillar for the future of the city and the province.

6.12.5.4 Trade

The trade sector, which is subdivided into rural and urban trade, has weaknesses:

In the rural trade subsector, there is no adequate system for marketing livestock and agricultural products that stimulates the supply of agricultural inputs and consumer goods; there is a lack of specific incentives for agents who may be involved in this sector; lack of a functional network; difficulties on the part of central bodies in implementing approved rural marketing programs; lack of technicians with the sensitivity and capacity to address the problems; lack of interest among traders in this line of business due to the low purchasing power of rural populations; lack of private investment; and lack of establishments in municipalities capable of supplying agricultural equipment and tools, seeds, pesticides, livestock medicines, and others.

In the urban trade subsector, weaknesses stem from the excessive concentration of commercial activities in the municipal capital; poor product quality and lack of control entities; poor enforcement of legislation and standards in the area of food quality; insufficient implementation of rural trade promotion programs; excessive bureaucracy and delays in the commercial licensing process; insufficient measures to protect domestic production; the exodus of traders and the rural population to urban centers and market computerization; poor information on the connection between food quality and public health; insufficient storage and preservation infrastructure; lack of regular surveys of commercial activities; municipal markets with poor hygiene and sanitation conditions; weakness in the marketing system for domestic goods; poor use of newly built markets; and the resulting weak purchasing power of the population; weak competitiveness of domestic production and constraints throughout the value chain.

Trade in the province benefits from the location of the seaport in the city of Lobito, which influences trade in the interior of the country. This is a privileged situation, as it is on the edge of the axis connecting the south and other parts of the country, and is also the main entry point for goods from the south. Commercial activity is characterized by formal and informal trade, which is carried out with some regularity in the coastal municipalities, namely Lobito, Benguela, and Baia Farta. Commercial agents are undercapitalized, a factor that prevents the relaunch of this activity at the level of municipalities, communes, and towns in the interior of the province.

The trade sector in Balombo is a vital part of the local economy, with a predominance of informal trade. Traditional fairs and markets, such as the central market in Balombo, are the main points of sale, where agricultural products, fresh food, clothing, and other everyday consumer items are sold. Formal trade is also present with establishments such as supermarkets and warehouses, but its presence is smaller compared to informal trade.

The trade sector in Balombo is a vital part of the local economy, with informal trade predominating. Traditional fairs and markets, such as the Balombo market, are the main points of sale, where agricultural products, fresh food, clothing, and other everyday items are sold. Formal trade is also present with establishments such as supermarkets and warehouses, but its presence is smaller compared to informal trade.

Balombo benefits from its proximity to the city of Benguela, which facilitates access to imported products and materials in high demand. Local commerce is also driven by the intermediation of traders between rural producers and urban consumers, creating a continuous flow of essential goods. The city, therefore, acts as a strategic point for the exchange of products between rural areas and neighboring cities.

Although the sector faces challenges, such as lack of infrastructure and difficulties in accessing credit, trade in Balombo has great potential for growth. Improvements in commercial infrastructure and support for local entrepreneurship can foster the sector's growth, generating more jobs, income, and access to essential products for the population. Strengthening local trade is crucial for the region's economic development.

Figure 40 – Balombo Market

6.12.5.5 Financial, Banking, and Insurance System

The banking and insurance sector in Balombo is growing, but still has limited financial infrastructure. The banking sector is essential for promoting local economic development, supporting merchants, rural producers, and the general population with credit, savings, and investment services. Among the banks present in Balombo are Banco de Poupança e Crédito (BPC), Banco Angolano de Investimentos (BAI), Banco Sol, and BIC, which together help to stimulate entrepreneurship and financial inclusion in the region.

Although the insurance sector is less developed, some insurance companies already operate in Balombo, such as ENSA – Seguros de Angola and Nossa Seguros, which offer products such as life, health, and auto insurance. These services are beginning to gain ground, but still face limitations in terms of reach and familiarity among the population, which has less experience with insurance.

The growth of the banking and insurance sector in Balombo faces challenges, including a lack of infrastructure and low levels of financial literacy. However, there is great potential for expansion with investments in financial infrastructure and inclusion programs, which could increase the population's access to essential financial services, strengthening the sector and boosting the region's economic development.

Figure 41 – Bic Bank branch in Balombo

6.12.5.6 Hospitality and Tourism

The tourism potential of Benguela province, exemplified by its beaches (the most famous, with the exception of Restinga do Lobito, are located south of Benguela, namely Baía de Stº. António or Baía das Vacas, Caota, Baía Azul, Caotinha), the landscape and natural heritage, transport facilities, and the dynamism evidenced by the hotel and restaurant offerings suggest that the province will, in the medium term, become an important tourist destination in the country and, if it evolves in a sustainable and consistent manner, a potential international holiday destination.

The province also boasts the Chimalavera Natural Park, located about 30 km from the city of Benguela, covering an area of 150 km2 and populated by small and large animals.

Benguela therefore has natural, cultural, and socioeconomic resources that make tourism a strategically important sector for the province, as it generates a multiplier effect on the region's economy by stimulating the development of a wide range of activities such as transportation, construction, trade and services, agriculture, and industry, among others. It is also a labor-intensive activity, creating many jobs. It generates significant income, brings in foreign exchange and public revenue, conserves and enhances heritage and culture, and encourages environmental preservation.

The hotel and tourism sector in Balombo is small but has potential for growth. The region is rich in natural landscapes and cultural traditions, which attracts tourists interested in exploring the outdoors and learning about the local historical heritage. Infrastructure is still limited, with few hotels and guesthouses, but these establishments provide a welcoming and authentic experience, reflecting the local hospitality.

Among the tourist attractions in Balombo are waterfalls and natural areas for hiking and outdoor activities, as well as historical sites such as churches and period buildings that tell part of the region's history and culture. The municipal market is also a popular attraction, where visitors can sample local products such as typical foods and handicrafts produced by residents.

The growth of the tourism sector in Balombo depends on investments in infrastructure, such as improvements to roads and the provision of hotel services. Structuring tourist packages that promote natural and cultural heritage can attract more visitors, benefiting the local economy by creating jobs and strengthening regional culture. Promoting sustainable tourism can be an effective way to develop the sector and ensure its contribution to the community.

Figure 42 – Ladefa-Balombo Restaurant

6.12.6 Social Facilities

6.12.6.1 School network

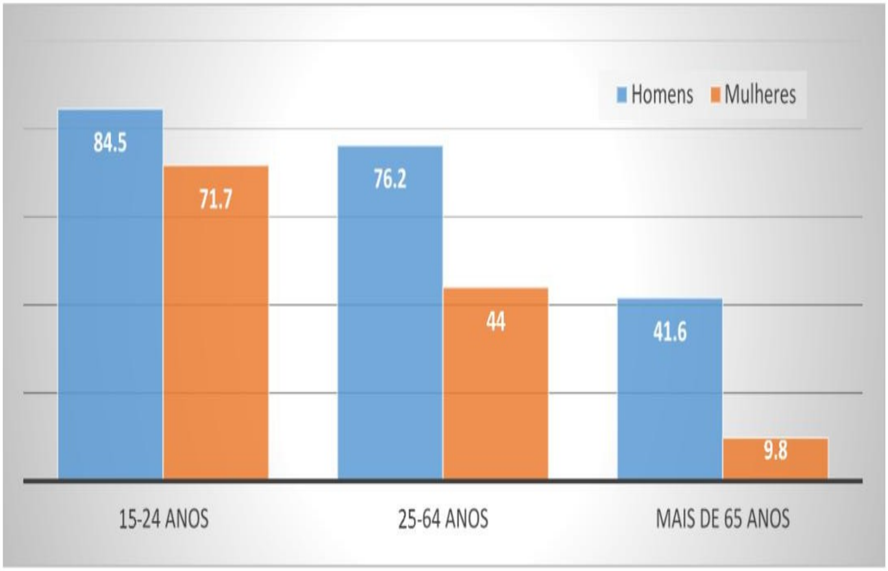
According to data from the 2014 census (INE, 2016a), the literacy rate in Benguela province is 63%, with 78% in urban areas and 36% in rural areas. In terms of gender, 78% of men can read and write, compared to 51% of women. The urban area of the municipality of Lobito has a rate of 84.3%.

The younger segments of the population (15-24 years old) are the most literate and where the ratio between men and women is most balanced, highlighting the two levels of effort in recent years: mass access to education and retention of girls in school.

Table 37: Literacy rate by area of residence, by sex, 2014

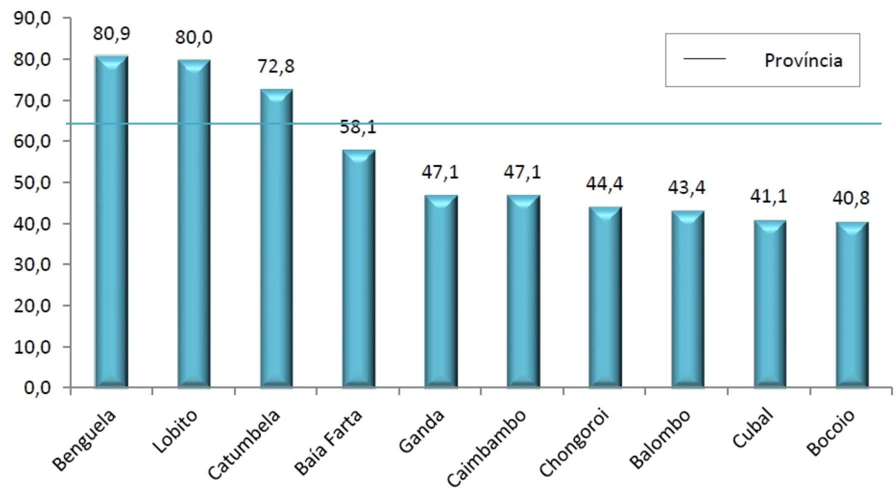
Província e área de residência	Total	Homens	Mulheres
Benguela	**63,3**	**77,6**	**51,3**
Urbana	77,5	89	67,8
Rural	36,3	55,2	21,3

Graph 5: Literacy rate by age group and gender



Analysis by municipality indicates that, in Benguela province, the lowest rate is found in the municipality of Bocoio, where only 4 in 10 people can read and write (41%).

Graph 6: Literacy rate by municipality, 2014



In 2014, only 12% of the population aged 18 or over had completed the second cycle of secondary education (had completed 12th or 13th grade). On the other hand, 19% of the population aged 18 or over had completed primary education (had completed 6th grade).

Table 38: Population aged 18 or over, by level of education completed, 2014

Província	Nunca frequentou	Nenhum nível	Ensino primário	I ciclo do ensino secundário	II ciclo do ensino secundário	Ensino superior
Benguela	26,8	26,2	18,5	15,3	11,5	1,7

The Balombo school system covers various levels of education, from early childhood education to secondary education. The city has several public and private schools, serving both the urban and rural populations. Primary schools include the 1º de Maio Primary School and the Catumbela Commune Primary School, while secondary education is provided by schools such as the Balombo Secondary School, which prepares students for higher education or the job market.

In addition to primary and secondary education, Balombo also offers technical and vocational courses in areas such as agriculture and administration, aiming to train young people for professional life. However, the school system faces challenges related to infrastructure and a lack of resources and teaching materials, which limits the quality of education and the capacity to train teachers.

Despite these difficulties, Balombo has great potential to improve education in the region by building new schools and improving existing ones. Investing in teacher training and improving teaching conditions can increase access to quality education, promoting the educational and social development of the city.

6.12.6.2 Hospital network

According to the Multiple Indicator Cluster Survey (MICS, 2015-2016), malaria is one of the main public health problems in Angola and is the leading cause of demand for health services, work and school absenteeism, and death. It is also one of the main causes of miscarriage, premature birth, low birth weight, anemia in pregnant women, and maternal and perinatal mortality.

It accounts for about 35% of demand for curative care, 20% of hospital admissions, 40% of perinatal deaths, and 25% of maternal mortality. The province of Benguela is at the second level of epidemiological endemicity 8: stable mesoendemic, where transmission is moderate and stable throughout the year.

Other notable diseases include diarrhea, chronic malnutrition, and acute respiratory infections, all of which are related to sanitation conditions and water supply.

Benguela is among the provinces with the highest prevalence of diarrhea (21%) and among those with the lowest rates of chronic malnutrition (33%).

The health network is characterized by insufficient infrastructure, equipment, and skilled workforce, which translates into a low level of service provision to the population.

The health sector in Balombo faces significant challenges related to infrastructure and resources, but it has a network of health facilities, such as health posts, medical centers, and the Balombo Municipal Hospital, which offer basic and specialized services to the local population. The hospital is the main care center in the city, with emergency services, surgeries, and hospitalization, while health posts mainly serve rural areas and offer preventive and emergency care.

The most common diseases in Balombo include malaria, intestinal diseases, respiratory infections, and diseases such as HIV/AIDS and tuberculosis. Lack of access to basic sanitation and clean water contributes to the high incidence of infectious diseases, especially during the rainy season, when malaria transmission increases considerably.

Despite the challenges, the health sector has great potential for improvement, especially with investments in infrastructure, training of health professionals, and disease prevention programs. Improvements in sanitary conditions, greater access to medicines, and expanded coverage of medical services are essential to promote the health of the population and reduce the incidence of disease in Balombo.

Figure 43 – Balombo Municipal Hospital

6.13 INFRASTRUCTURE

6.13.1 General Considerations

This descriptor comprises an analysis of the infrastructure in the project area, namely the electricity and water supply networks, road network, etc.

6.13.2 Electricity Supply Network

According to data from the 2014 Census, only 26% of households in Benguela province have access to electricity from the public grid.

Table 39: Households with access to electricity from the public grid by area of residence, 2014

Província e área de residência	Nº	%
Benguela	**124848**	**25,8**
Urbana	123340	41,1
Rural	1508	0,8

The electricity distribution network in Balombo is an essential infrastructure for local development, providing electricity to both the urban population and some rural areas. This network is responsible for supplying energy to homes, businesses, and public sectors, although there are still challenges in reaching more remote areas.

The National Electricity Distribution Company (ENDE) is responsible for managing and operating the electricity distribution network in Balombo, as well as in other regions of Angola. ENDE is responsible for maintaining and expanding the distribution network, making new connections, and ensuring that energy is delivered continuously and with high quality.

As for the number of electrical connections, it is estimated that in Balombo and similar municipalities in the province of Benguela, the number is still limited, with part of the population dependent on alternative sources, such as generators, especially in rural areas. The expansion and modernization of electrical connections are a goal of ENDE, although full coverage still depends on infrastructure improvements and additional investments.

Graph 7: Households, by main type of lighting, 2014

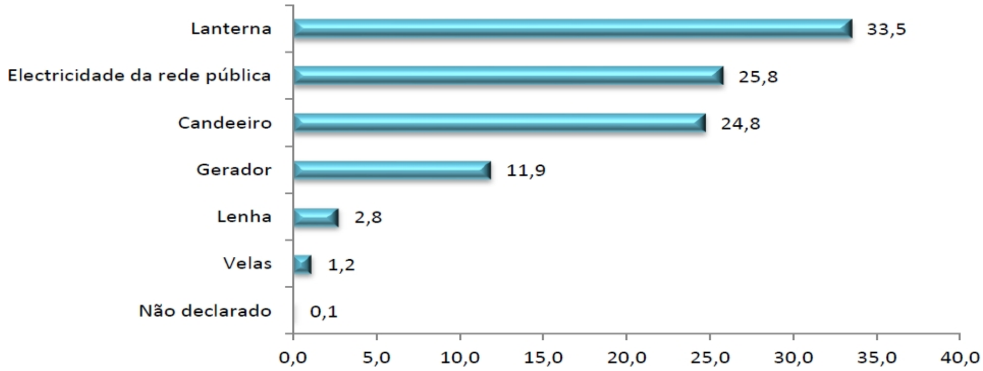


Figure 44 – Balombo Thermal Power Plant ENDE

6.13.3 Water Supply Network

According to the results of the 2014 Census, about 59% of households have access to appropriate sources of drinking water.

Table 40: Households with access to appropriate drinking water by area of residence, 2014

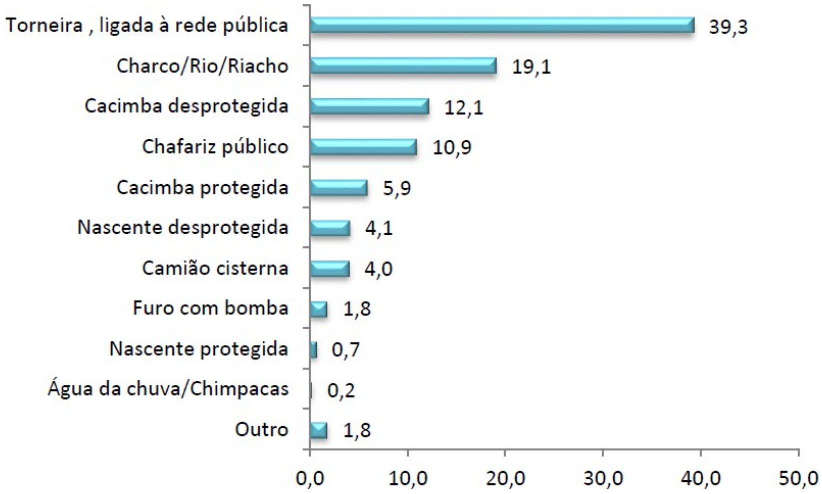
Província e área de residência	Nº	%
Benguela	**283 484**	**58,6**
Urbana	249 665	83,2
Rural	33 819	18,4

The water supply system in Balombo is essential to serve both urban and rural areas, although it faces significant challenges. This system consists of water collection, treatment, and distribution to the population. The main sources of water collection in Balombo are local rivers and springs, which supply reservoirs and water treatment plants before being distributed.

The Benguela Public Water and Sanitation Company (EPASB) is responsible for managing and operating the water supply system in Benguela, including the municipality of Balombo. This company's mission is to ensure the supply of drinking water of sufficient quality and quantity to meet the needs of the population.

However, water supply in the region still has limitations, especially in more remote and rural areas, where access to drinking water is less reliable. EPASB faces challenges such as poor infrastructure and the need to maintain and expand water treatment and distribution systems so that they can efficiently meet the growing demand of the population of Balombo.

Figure 8: Households, by main sources of drinking water supply, 2014



Water supply in Balombo is provided by the public company, while in less developed areas residents resort to rivers for their water supply. Water is mainly used for domestic purposes, food, personal hygiene, agricultural irrigation, animal consumption, and industrial use. In the project area, drinking water is supplied through fountains and connection to the public network (Kilamba neighborhood), and there are also artesian wells nearby.

6.13.4 Basic sanitation

At the provincial level, only 45% of households use an appropriate place to defecate. However, this figure is only 4% in rural areas and 71% among residents in urban areas.

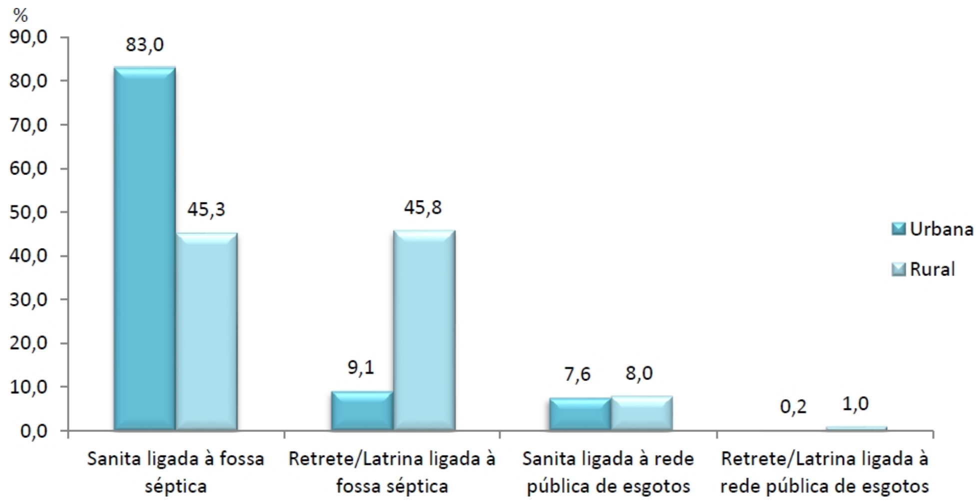
Table 41: Households using appropriate facilities for defecation by area of residence, 2014

Província e área de residência	Nº	%
Benguela	**219 234**	**45,3**
Urbana	212 266	70,7
Rural	6 969	3,8

The basic sanitation sector in Balombo is still developing and faces several challenges in ensuring the proper collection and treatment of solid waste and domestic effluents. Basic sanitation in the region covers waste collection, sewage management, and the implementation of sanitary control measures, although coverage is limited, especially in rural and less urbanized areas.

The Benguela Water and Sanitation Company (EASB) is primarily responsible for managing basic sanitation in the region, including the municipality of Balombo. EASB works to implement and improve the solid and liquid waste collection and treatment system, with a focus on minimizing risks to public health and the environment.

Figure 9: Households using appropriate sanitation facilities by area of residence, 2014



However, the sector still faces challenges, such as insufficient infrastructure to serve the entire population and the need for greater public awareness of safe waste disposal practices. In rural areas, access to basic sanitation is even more limited, with many residents using septic tanks or rudimentary methods of waste disposal. EASB, in partnership with local authorities, seeks to expand services

services, but this depends on investments in infrastructure, education and awareness programs, and improvements in technical resources.

6.13.5 Road Network and Transportation

The road network in Balombo, in Benguela province, consists mainly of asphalt and dirt roads, with National Road 250 (EN-250) being the main access route to the municipality, connecting it to the city of Benguela. Although road infrastructure has improved over the years, many roads still require maintenance, especially in rural areas, where dirt roads are common. National Road 105 (EN105) is also important for local connectivity. Overall, road quality is variable, with some roads requiring investment in drainage and paving.

Balombo's transportation system is predominantly road-based, with public transportation provided by minibuses and buses connecting the city to other locations. In addition, taxis provide urban transportation. The transportation of goods, such as agricultural products, is mainly carried out by pickup trucks and lorries. However, more remote areas face challenges due to a lack of public transportation options and the limited quality of transportation infrastructure.

The Balombo Municipal Administration, in collaboration with the Angolan Ministry of Transport, oversees the management of the road network and public transport. Despite modernization efforts, the transport system still faces challenges in terms of coverage and efficiency, especially in areas further away from the city, where the population relies on informal transport alternatives.

The transport sector in Balombo and much of Angola remains underdeveloped, with growing demand for improvements in infrastructure and services. Road expansion and maintenance, along with the expansion of quality public transport, are key issues for the municipality's growth and integration. Increased investment in road infrastructure and transport will be crucial to ensuring mobility and development in the region.

Despite the challenges, local authorities have been making efforts to improve road infrastructure and expand the transport network, with the aim of facilitating urban mobility and access to rural areas. Improving roads and public transport is crucial to supporting the region's economic and social development and ensuring the population's quality of life.

6.14 LAND USE PLANNING

6.14.1 General Considerations

The purpose of this descriptor is to identify the land management instruments approved and/or in force in the province of Benguela, based on information gathered from local authorities and bibliographic research.

6.14.2 Municipal Master Plan

The Balombo Municipal Master Plan is a strategic document for urban planning and development in the municipality, which aims to organize and guide the growth of the city and the region, promoting land use, infrastructure, and public services in a sustainable manner. This plan covers fundamental aspects such as urban expansion, the distribution of residential, commercial, and industrial areas, the improvement of basic services such as water, sanitation, and transportation, as well as prioritizing environmental protection and land use planning.

The plan aims to ensure that Balombo's growth occurs in a balanced and planned manner, meeting the needs of the population and respecting available resources. It should define specific areas for the construction of new housing, commercial establishments, and public spaces in order to avoid disorderly occupation and promote the well-being of the community.

Presidential Order No. 26-21, which approved the Balombo Municipal Master Plan, was formalized by the Provincial Government of Benguela and aims to implement integrated public policies for territorial and urban development, in accordance with the guidelines established by the Angolan Ministry of Spatial Planning and Housing. This plan is part of a series of measures aimed at modernizing urban infrastructure, improving public services, and ensuring the municipality's long-term sustainability.

In general terms, the Balombo Master Plan, like other municipal plans in the country, seeks to align local development with national urbanization and territorial planning policies, promoting a more organized environment with quality of life for citizens and ensuring the orderly expansion of the city.

6.15 HISTORICAL AND CULTURAL HERITAGE

6.15.1 General considerations

The purpose of this descriptor is to identify and characterize the historical and cultural heritage that may exist at the project site and in its immediate surroundings.

The characterization of the heritage was based on fieldwork carried out on site in August 2024 and on bibliographic research.

6.15.2 Inventory of Existing Heritage Sites

There is no classified heritage in the municipality of Balombo.

Balombo and the Benguela region have a history deeply marked by the presence of different peoples and cultures over the centuries, including the strong influence of communities such as the Ovimbundu and Mbundu, which are the predominant ethnic groups in the area. The municipality itself and its surrounding areas played an important role during colonial times, especially with regard to agriculture and the exploitation of natural resources, as well as being centers of communication and trade between different regions of Angola.

Some important historical sites in Balombo include colonial forts, traditional markets, and old churches, which serve as symbols of colonial history and the struggle for independence. The House of Culture in Balombo also plays an important role in preserving local cultural memory, providing a space for events, exhibitions, and the promotion of the region's artistic traditions.

The cultural heritage is deeply influenced by the traditions of the Ovimbundu, who are known for their dances, music, and rituals. Religious celebrations and initiation rituals are significant practices, with emphasis on rites of passage, which mark important stages in the lives of young people, such as initiation into adulthood. These rituals involve traditional dances, music, and symbolism that reflect the spiritual beliefs and cultural practices of the community.

In linguistic terms, the Balombo region is predominantly linguistically and culturally diverse. Languages spoken include Umbundu, which is the mother tongue of a large part of the population and one of Angola's main Bantu languages. Portuguese, as the official language of Angola, is also widely spoken, especially in urban and administrative areas. Other Bantu languages can be heard in smaller communities that keep their linguistic traditions alive.

Balombo's historical and cultural heritage is vital to local identity, as it connects present generations to their historical and cultural roots. Knowledge of oral traditions, legends, and daily practices of local communities is kept alive through storytellers, dance masters, and musicians. In addition, cultural and religious practices also play an important role in social cohesion and the preservation of the region's identity. The city of Balombo, with its unique customs and culture, represents a significant part of Angolan heritage.

Figure 45: Former Balombo High School 6002

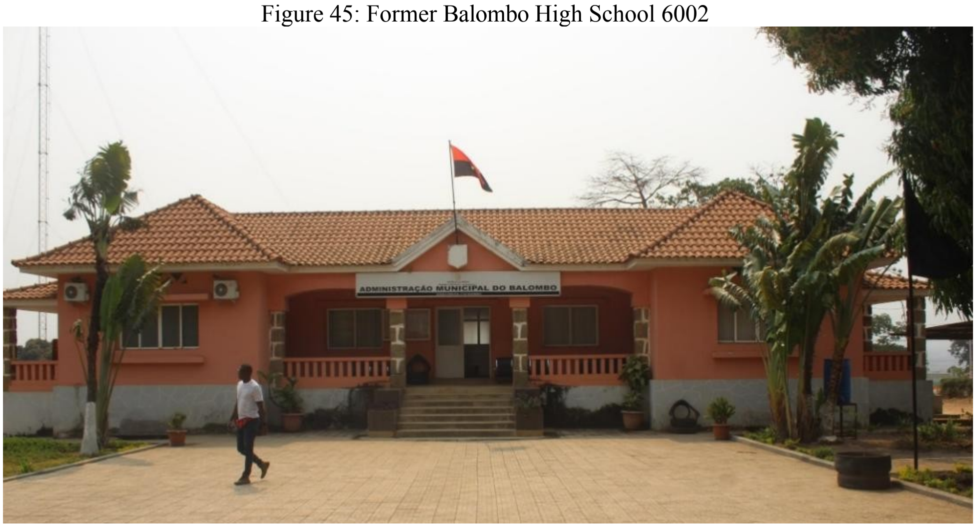


Figure 46: Colonial Administration Building in Balombo

6.16 PROJECTION OF CURRENT CURRENT IN ABSENCE OF THE PROJECT

The identification of the evolution of the state of the environment without the Project or projection of the current situation is based on the perspective of the continuation of the characteristics and trends that are felt at the time this projection is made.

The Project under analysis is located in an area that is strategically located for the storage and distribution of grain, as it is in an industrial zone and has access roads that facilitate the transport of stored grain for export and import.

Therefore, in a scenario where the Project is not built, it is expected that the current state of the environment will evolve in the long term towards the occupation of this area by industrial activities due to the aforementioned soil characteristics.

It should also be noted that the province of Benguela has been the target of various investments and interventions in the agricultural and industrial sectors, in order to foster and promote the role of the private business sector and end regional asymmetries, contributing to the development of the province and the country.

Based on the above, it is not expected that, from the point of view of the evolution of the current situation, there will be any substantial changes in the state of the environment that would justify a different analysis from the characterization of the current situation now carried out.

7 ENVIRONMENTAL IMPACT ASSESSMENT

7.1 METHODOLOGY AND EVALUATION CRITERIA

This chapter presents the identification and assessment of the relevant environmental and social impacts resulting from the construction, operation, and decommissioning phases of the agricultural infrastructure (silos) of the Carrinho, SA Silo Plant.

The impact assessment process is a predictive exercise based on comparing the foreseeable environmental and social effects of the Project, based on knowledge of its characteristics, with the baseline situation of the environment in the study area. The identification of impacts also benefits from existing knowledge about the environmental and social impacts generated by projects similar to the Project under analysis, as well as from the technical team's previous experience in conducting environmental and social impact studies. The prediction of environmental and social impacts allows for the assessment of the environmental and social sustainability of the Project and provides a basis for proposing environmental and social mitigation measures to enhance this sustainability.

Environmental and social impact is understood to mean a change in the current state of the environment that results directly or indirectly from the Project under analysis. Each potential impact identified is assessed in terms of its value, magnitude, and significance.

In addition, and whenever necessary, the assessment of impacts can also be systematized according to the following classification criteria:

- **Signal** - negative, positive, depending on whether the impact degrades, enhances, or does not affect the current state of a given environmental component;
- **Spatial dimension (Incidence)** - local, extended, regional, according to the extent of the area in which the effects of the impact are felt;
- **Probability of occurrence** - certain, probable, improbable, and uncertain. The probability assigned to impacts took into account knowledge of the characteristics of each of the actions and each environmental factor, as well as existing knowledge about the impacts of similar projects;
- **Duration** - temporary or permanent, depending on whether the effects of the impact occur only during a specific and identifiable period of time, or whether they persist indefinitely;

- **Reversibility -** reversible or irreversible, according to the potential for restoring the environmental component to its pre-project situation, either passively (with the cessation of the cause of the impact) or actively (through recovery measures);
- **Time dimension:** immediate, when the impact occurs during or immediately after the action that causes it; medium-term (approximately up to five years) or long-term;
- **Type of occurrence**: direct or indirect, depending on whether they are directly determined by the project or induced by related activities;
- **Magnitude**: low, moderate, or high, depending on the degree of impact on the environmental values in question;
- **Capacity for minimization or compensation:** refers to the measures and actions implemented to reduce the severity of negative impacts caused by a project on the environment;
- **Significance**: insignificant, significant, or very significant. The significance of an impact is considered to be the most important descriptive criterion of the impact, and its degree is determined by evaluating all other assessment criteria, with particular emphasis on the magnitude, duration, and reversibility of the impact. The degree of significance attributed to an impact is also influenced by compliance with current legal provisions. Significance thus represents an overall assessment of the importance of the environmental effect produced by the impact.

For the assessment of impacts, and in order to provide an overall picture of them, a classification scale based on the following parameters will be used to calculate the significance of the impact, as illustrated in the table below.

Table 42: Summary of criteria used for impact assessment

Classification criterion	Scale	Value (for calculating the significance of the impact)
Nature (Sign)	Positive (+) or Negative (-)	Not applicable
Incidence	Local/Direct	1
	Extended	2
	Regional/National/International	3
Probability of occurrence	Unlikely	1
	Uncertain	2
	Likely	3
	Certain	4
Duration	Temporary	1
	Permanent	2
Reversibility	Reversible	1
	Irreversible	2
Dimension	Immediate	1
	Medium term	2
	Long term	3
Type of occurrence	Direct or Indirect	Not applicable
Magnitude	Reduced	1
	Moderate	2
	High	3
Significance	Not very significant	1
	Significant	2
	Very significant	5
Minimization or compensation capacity	Minimizable and/or compensable	1
	Not minimizable or compensable	2

The classification regarding the **significance of environmental and social impacts** will be obtained by multiplying the following criteria: Probability (P), Incidence (I), Magnitude (M), and Duration (D), using the following formula.

S=PxIxMxD

The significance of environmental and social impacts is assigned according to the intervals of the score values on the following scales:

- **Not significant** if the score is between 1 and 11 points;
- **Significant** if the score is higher than 12 and equal to 23 points;
- **Very significant** if the score is equal to or exceeds 24 points;

Table 43: Acronyms used in the impact assessment scale

CRITERIA	SCALE			
Duration	Temporary **(T)**	Permanent **(P)**		
Magnitude	Reduced **(R)**	Moderate **(M)**	High **(H)**	
Probability	Uncertain **(U)**	Unlikely **(UNL)**	Likely **(LIK)**	Certain **(C)**
Occurrence	Indirect **(IN)**	Direct **(DIR)**		
Incidence	Local **(L)**	Extended **(E)**	Regional **(RE)**	
Reversibility	Irreversible **(IR)**	Reversible **(RV)**		
Nature (Signal)	Positive (+)	Negative (-)		
Capacity minimization or compensation	Minimizable and/or compensable **(MC)**	Not minimizable or compensable **(NMC)**		

Table 44: Identification of significance according to colors

Not significant		**Negative, not very significant**	
Significant		**Significant Negative**	
Very Significant		**Very Significant Negative**	

Cumulative: a cumulative environmental impact is derived from the sum of other impacts or chains of impacts that add up, generated by one or more isolated but contiguous projects in the same environmental and social system.

Synergy: refers to the ability of a specific effect to induce a new impact when interacting with another, not necessarily associated with the same project or activity.

Example:


Empreendimento
Impacto A
Empreendimento
Impacto B
Interação
Impacto C

7.2 MAIN ACTIONS AND POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

The main actions that generate negative environmental and social impacts during the construction, operation, and decommissioning phases are identified below (Tables 45, 46, and 47).

It should be noted that the project under evaluation does not involve the displacement of populations.

Table 45: Main project actions generating negative impacts during the construction phase

Main actions generating impacts	Main direct negative impacts
Setup of the construction site and other support areas, including the presence of workers, equipment, and materials	Generation of noise and dust, emission of atmospheric pollutants, disturbance to the neighborhood, and risk of work-related accidents
General circulation of vehicles, machinery, and equipment and workers involved in the construction process	Generation of noise and dust, and emission of atmospheric pollutants
Transport of aggregates to the construction site	Noise and dust generation, and emission of atmospheric pollutants
Cleaning, excavations for opening foundations	Generation of noise and dust, and emission of atmospheric pollutants
Assembly of silos	Generation of noise and dust, and emission of atmospheric pollutants, disturbance of the neighborhood, and risk of work-related accidents
Demobilization and dismantling of the construction site	Noise and dust generation, emission of pollutants emissions and production of waste
Final cleaning of the construction site.	Noise and dust generation, emission of pollutants emissions and production of waste

During **the operational phase**, the following actions are considered likely to generate negative impacts on the environment:

Table 46: Main project actions generating negative impacts during the operational phase

Main actions generating impacts	**Main direct negative impacts**
Silo handling	Generation of noise and dust, disturbance to the neighborhood, and risk of work-related accidents
Handling of cereals	Risks of pest proliferation
Circulation of light and heavy vehicles	Noise generation and emission of atmospheric pollutants and disturbance to the surrounding population
Fuel supply	Risks of environmental contamination
Water and electricity consumption and effluent generation	Pressure on urban infrastructure
Operation of generators	Noise and air pollutant emissions
Cleaning, pest control, and facility maintenance	Risks of environmental contamination, waste generation, noise, and atmospheric pollutant emissions atmospheric
Grain transportation	Pressure on urban infrastructure, noise generation and pollutant emissions, disturbance to the population, and accident risks

During **the decommissioning phase**, the following actions are considered likely to have an impact on the environment:

Table 47: Main project actions generating negative impacts during the decommissioning phase

Main actions generating impacts	Main direct negative impacts
Demolition of infrastructure and removal of silos and other equipment	Generation of noise, dust, and atmospheric pollutant emissions; risks of work-related accidents
Demobilization and dismantling of support areas	Noise, dust, and air pollution, work-related accident risks, environmental contamination risks
Permanent decommissioning of facilities	Decrease in employment and standard of living of the population, and decline in the local socio-economy, etc.
Final cleanup	Generation of noise and dust, emission of pollutants emissions and production of waste

The actions resulting from the construction, operation, and decommissioning of agricultural silo infrastructure may have not only negative but also positive environmental and social impacts, assessed according to the classification criteria identified in section 7.1. These will have an impact on the following descriptors:

7.3 CLIMATE

7.3.1 Construction phase

<u>Change in evapotranspiration and temperature at ground level</u>

During the construction phase, actions related to excavation and soil sealing for the creation of new areas for the assembly of silos may have an impact on evapotranspiration and temperature at ground level.

The impacts on the climate will be negative, of reduced magnitude, direct, probable, localized, temporary, reversible, and insignificant.

7.3.2 Operation phase

Increased perception of heat discomfort

During the operational phase, actions resulting from the waterproofing of surfaces and the installation of equipment and buildings will temporarily alter the conditions of solar radiation absorption and reflection, as well as air circulation, contributing to an increase in the perception of heat discomfort.

The impacts on the climate, although negative, will be of reduced magnitude, direct, probable, localized, temporary, reversible, and insignificant.

7.3.3 Decommissioning phase

Change in evapotranspiration and ground temperature

During this phase, changes may occur mainly after the decommissioning work has been completed. However, changes in evapotranspiration and ground-level temperature may be observed.

These are positive impacts, of reduced magnitude, direct, probable, localized, permanent or temporary, reversible, and insignificant.

7.4 LOCAL GEOLOGY AND GEOMORPHOLOGY

7.4.1 Construction phase

Change in local geomorphology

During the construction phase, activities related to excavation, waterproofing, and soil modeling for the creation of new areas for the assembly of silos, parking lots, and other buildings may have an impact on the local geomorphology.

The impacts on this descriptor will be negative, of reduced magnitude, direct, certain, localized, temporary, reversible, and insignificant.

7.4.2 Operational phase

Change in local geomorphology

In general, for geology and geomorphology, the impacts are due to the artificialization of the landforms caused by the presence of the silo plant. The impact generated is negative, direct, localized, irreversible, certain, permanent, of reduced magnitude, and insignificant.

7.4.3 Decommissioning phase

Change in local geomorphology

At this stage, changes may occur in terms of the artificialization of the relief and erosion of the upper formations and upper substrate due to excavations carried out to remove the structural foundations.

At this stage, negative, direct, temporary, localized, probable, immediate, irreversible, and insignificant impacts are expected.

7.5 SOILS

7.5.1 Construction phase

Compaction, contamination, and erosion of soils

With regard to soils, it is considered that actions related to the installation of silos and the movement of machinery and vehicles may cause soil compaction, impermeabilization, contamination, and erosion.

The impacts on this descriptor will be negative, low in magnitude, direct, probable, localized, temporary, reversible, and insignificant.

7.5.2 Operation phase

Soil compaction

During the project's operational phase, the main impacts are related to the area occupied by the Silo Plant's infrastructure, which may be subject to soil compaction due to vehicle and pedestrian traffic.

Therefore, impacts on the soil are expected during this phase and are classified as negative, direct, localized, reversible, permanent, probable, of reduced magnitude, and insignificant.

Accidental contamination

During the project's operational phase, the main impacts are related to the area occupied by the Silos Center infrastructure and unpaved areas exposed to the risk of spills (fuel and oil leaks) and wastewater.

Therefore, impacts on the soil are expected during this phase and are classified as negative, direct, localized, reversible, temporary, probable, of reduced magnitude, and insignificant.

7.5.3 Decommissioning phase

Soil compaction, contamination, and erosion

At this stage, erosion of exposed soils, soil compaction, and removal or alteration of soil at the site may have an impact.

However, these are negative impacts of reduced magnitude, direct, probable, local, temporary, reversible, immediate, and insignificant.

During site restoration, the return of the soil to its undisturbed state is a positive impact that is minor, direct, probable, localized, permanent, reversible, medium- to long-term, and insignificant.

7.6 LAND USE

7.6.1 Construction phase

Change in land use

With regard to this descriptor, in the construction phase, the impacts are considered to be related to the construction of infrastructure, the risk of spills and soil contamination during the supply of machinery, generators, and preventive maintenance.

The impacts on this descriptor will be negative, low magnitude, direct, probable, localized, temporary, reversible, and insignificant.

7.6.2 Operation phase

Change in land use

At this stage, it is considered that the occupation of land by the Silos Plant infrastructure will have negative impacts that are minor in magnitude, direct, certain, localized, permanent, irreversible, immediate, and insignificant.

7.6.3 Decommissioning phase

Change in land use

At this stage, after the decommissioning of the infrastructure, the area may return to its natural state prior to the implementation of the Silos Plant. However, soil compaction and removal or alteration of the soil at the site may cause an impact.

However, these are negative impacts of low magnitude, direct, probable, local, temporary, reversible, and insignificant.

During the recovery of the site, the return of the soil to its undisturbed state is a positive impact, of reduced magnitude, direct, probable, localized, permanent, reversible, medium and long-term, and insignificant.

7.7 WATER RESOURCES

7.7.1 Construction phase

Contamination of surface water

At this stage, it is considered that earthworks (landfills and excavations), accidental spills, and waste production during the installation of the silos could cause these materials to be washed away by rain.

In general, this impact is considered to be negative, temporary, reversible, of reduced magnitude, probable, localized, and insignificant.

Groundwater contamination

During the movement of machinery and vehicles assigned to the works, accidental spills (oils and fuels) may occur, which may cause pollution of any existing groundwater and surface water. The impacts are considered negative, insignificant, reversible, of reduced magnitude, indirect, unlikely, localized, and temporary, with the adoption of mitigating measures.

7.7.2 Operation phase

Contamination of surface water

In the area where the Silo Plant is located, there is a fuel storage tank in the service area for the operation of the generators. If an accidental leak occurs in this storage facility and contaminates the waterways, the impact is considered to be negative, direct, localized, temporary, reversible (taking into account the removal of pollutants), short-term, probable, of reduced magnitude, and insignificant.

The effluents generated at the Silos Plant are domestic and industrial in nature. After being collected and treated, they will be discharged into the receiving environment. In the absence of *on-site* treatment conditions, they must be sent to a specialized unit for proper treatment.

Impact on surface drainage patterns

At this stage, actions resulting from the waterproofing of surfaces and roofing may affect surface water drainage patterns and increase runoff during the rainy season.

This will generate probable, localized, permanent, reversible, direct, minor, and insignificant negative impacts.

Contamination of groundwater

In the event of disruptions or failures in the conveyance and treatment of effluents, spills, and waste runoff, and if these are discharged into waterways or infiltrate the groundwater, they may cause contamination.

This will generate negative, uncertain, localized, temporary, reversible, immediate, direct impacts of reduced magnitude and little significance.

Decrease in the local water table

In the event of supplying the facilities with groundwater resources through a borehole and pump, this action may affect the water table, causing negative, uncertain, widespread, permanent, irreversible, long-term, indirect impacts of reduced magnitude and little significance.

7.7.3 Decommissioning phase

<u>Contamination of surface and groundwater</u>

At this stage, impacts may occur due to spills of products such as fuel, oils, and wastewater effluents during the dismantling of equipment, which may affect groundwater quality. However, this is unlikely to happen, as the equipment will only be dismantled after it has been emptied. In the event of an incident, there will be negative impacts of reduced magnitude, direct, probable, local, temporary, reversible, and insignificant.

A gradual return to undisturbed surface water drainage patterns may also be observed.

These are positive impacts, of reduced magnitude, direct, probable, local, temporary, reversible, and insignificant.

7.8 FLORA

7.8.1 Construction phase

<u>Disturbance and destruction of flora</u>

With regard to flora, it is considered that the main impacts will have occurred during the clearing of the land and deforestation. Therefore, no further deforestation is planned during the assembly phase of the new silos. However, actions related to excavation and leveling of the implementation area and vehicle traffic may cause dusting of the surrounding flora and interfere with plant photosynthesis.

The impacts on this descriptor will be negative, of reduced magnitude, direct, probable, localized, temporary, reversible, and insignificant.

7.8.2 Operation phase

<u>Disturbance and destruction of flora</u>

During the operational phase, the impacts caused during the construction phase will continue, particularly in terms of destruction, compounded by dusting of the vegetation cover due to the emission of particulate matter from the circulation of machinery and vehicles assigned to the facilities, with effects on the surrounding flora.

The cleaning of silos using suction during the operational phase and traffic on the access road to the Silos Plant may contribute to increased levels of dust and particulate matter emissions.

These impacts are considered to be negative, direct, of reduced magnitude, localized, long-term, probable, reversible, temporary, minimizable, and insignificant.

7.8.3 Decommissioning phase

Disruption and destruction of flora

During the decommissioning phase, the expected impacts are similar to those of the construction phase, in that most of the actions are similar in nature, not involving the construction or implementation of infrastructure, but rather its demolition or dismantling. However, given that the areas to be intervened will already be devoid of vegetation, the expected impacts are assessed as less significant compared to the construction phase. Thus, the impacts on flora and vegetation at this stage are assessed as negative, direct, localized, temporary, immediate, certain, reversible (if a landscape recovery plan appropriate to the area in question is implemented), of reduced magnitude, minimizable (if the limits of the intervention area are respected, without occupying surrounding areas and using existing accesses) and insignificant.

As in the construction phase, actions involving the movement of earth and other materials, the circulation of vehicles and heavy machinery on unpaved access roads will result in the dispersion of dust which, when deposited on the surrounding vegetation, may affect its development. This impact is assessed as negative, direct, temporary, localized, probable, reversible, of reduced magnitude, minimizable, and insignificant.

The last action in this phase will be the implementation of a redevelopment plan, which includes the renaturalization of the affected areas after the land has been cleared. These actions will reverse the negative effects observed in the previous phases, since their impacts are assessed as: positive, certain, direct, permanent, localized, long-term, reversible,
, of reduced magnitude, and insignificant.

The recovery of local flora may also occur during this phase, which translates into a gradual return to an undisturbed state after decommissioning work. This is a positive impact, of reduced magnitude, direct, certain, localized, temporary, reversible, and insignificant.

7.9 FAUNA

7.9.1 Construction phase

<u>Scaring away fauna</u>

With regard to fauna, it is considered that the main impacts will have occurred during excavation and land leveling, since the area has already been subject to deforestation in the past. Therefore, at this stage, it is considered that the movement of machinery and vehicles, and increased noise during the construction and assembly of the silos, may cause species to flee.

These impacts are considered to be negative, direct, of reduced magnitude, localized, probable, reversible, temporary, minimizable, and insignificant.

<u>Running over and/or killing of species</u>

It is considered that the circulation of machinery and vehicles may cause the running over or death of species.

These impacts are considered negative, direct, of reduced magnitude, widespread, uncertain, reversible and irreversible (in the case of species death), temporary, minimizable, and insignificant.

7.9.2 Operation phase

<u>Scare away wildlife</u>

During the operation phase, the impacts originating in the construction phase will continue, namely in terms of habitat affectation, either due to the destruction of vegetation cover or to the disturbance induced by the normal operation of the Silo Plant and lighting projection, causing the scaring away of species.

These impacts are considered to be negative, of reduced magnitude, direct, uncertain, localized, permanent, irreversible, and reversible, and insignificant.

<u>Running over and/or killing of species</u>

It is considered that the circulation of vehicles assigned to the facilities may cause the running over or death of species.

These impacts are considered to be negative, direct, of reduced magnitude, localized, uncertain, reversible and irreversible (in the case of species death), permanent, minimizable, and insignificant.

7.9.3 Decommissioning phase

Frightening away of fauna

During this phase, species may be scared away by the noise during demolition. In any case, the impacts generated will be negative, moderate in magnitude, direct, certain, local, temporary, reversible, immediate, but insignificant.

After decommissioning work, there may also be a gradual return of fauna to an undisturbed state during this phase. These impacts are positive, of reduced magnitude, direct, probable, localized, temporary, reversible, and insignificant.

Running over and/or death of species

It is considered that the circulation of machinery and vehicles may cause the running over or death of species.

These impacts are considered negative, direct, of reduced magnitude, localized, probable, reversible and irreversible (in the case of species death), temporary, minimizable, and insignificant.

7.10 LANDSCAPE

7.10.1 Construction phase

Landscape alteration

At this stage of the project, the impacts on landscape change resulting from the implementation of new infrastructure that may contrast with existing infrastructure are considered.

At this stage, the impacts on the landscape are considered to be negative, moderate in magnitude, direct, certain, temporary, localized, reversible, and insignificant.

7.10.2 Operational phase

Landscape change

During the operation phase, the impacts felt during the construction phase relating to functional and visual changes to the landscape will continue during the operation phase, where the following will occur process of adapting the landscape to the new reality, i.e., the presence of the Silos Plant infrastructure in a semi-natural, topographically flat area with a significant visual basin due to its proximity to the main road (EN-250) that passes in front of the facilities and residential areas, namely the Kilamba neighborhood.

The visual presence of the Silos Plant infrastructure will contrast with the landscape, causing negative impacts of moderate magnitude that are direct, certain, localized, permanent, irreversible, and significant.

7.10.3 Decommissioning phase

Landscape change

During this phase, there may be a visual impact during the decommissioning of the Silos Plant, a change in the character of the landscape, and if abandoned, it may result in possible misuse and vandalism of the infrastructure.

These are considered to be negative impacts on the landscape of low and high magnitude (in the case of abandonment), direct, certain, local, temporary, and permanent (in the case of abandonment), reversible, immediate, and insignificant.

However, during the recovery of the landscape, a gradual return of the landscape to its undisturbed state can be observed.

Positive impacts, of reduced magnitude, are direct, probable, localized, temporary, reversible, and insignificant.

7.11 AIR QUALITY

7.11.1 Construction phase

Emissions of pollutants and particulate matter

At this stage of the project, it is considered that the impacts are generated due to the emission of pollutants and particulate matter from the circulation of vehicles, machinery, and excavations.

In view of the above, the impacts on air quality are negative, direct, temporary, reversible, certain, localized, of reduced magnitude, and insignificant.

7.11.2 Operation phase

Emissions of pollutants and particulate matter

During the project's operational phase, actions likely to cause changes in air quality are due to new sources of pollutants originating from the operations taking place, namely, the circulation of heavy vehicles accessing the infrastructure, loading and unloading of grain, the circulation of machinery associated with the movement of grain, heavy and light vehicle traffic, fuel supply, and the operation of electric generators.

Air pollutants are usually divided into three broad categories: greenhouse gases (GHGs), eutrophicating and acidifying substances, and tropospheric ozone precursor substances.

The main eutrophying and acidifying gases resulting from anthropogenic activity are sulfur dioxide (SO2), nitrogen oxides (NOx), ammonia (NH3), and particulate matter (PM).

In high concentrations, these gases can cause damage not only to human health and cultural heritage, but also to the environment, contributing to the degradation of ecosystems and the eutrophication and acidification of soil and water.

The precursor substances of tropospheric ozone include polluting gases such as nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOCs), carbon monoxide (CO), and methane (CH4). Ozone can cause health problems, particularly affecting the respiratory system, even at low concentrations and after short-term exposure, with the most vulnerable groups such as children, the elderly, and people with a history of lung problems being particularly affected.

CO_2, a greenhouse gas (GHG), is a product of combustion and as such is released in exhaust gases. Consequently, both private transport and road freight contribute to the release of greenhouse gases and contribute to climate change.

The suspended particles released contain small amounts of sulfates, nitrates, metals, and other trace elements, which are also toxic. Nitrogen oxides and suspended particles are the most relevant constituents due to their higher presence in exhaust gases.

Gaseous emissions from heavy goods vehicles powered by diesel, the fuel generally used in freight transport, include carbon dioxide (CO_2), oxygen (O_2), water vapor, nitrogen (N_2), carbon monoxide (CO), nitrogen compounds (NO_x), sulfur compounds (SO_x), and volatile organic compounds (VOCs).

During the operational phase, negative impacts on air quality are expected to be moderate in magnitude, direct, certain, localized, permanent, reversible, and insignificant.

7.11.3 Decommissioning phase

Emissions of pollutants and particulate matter

During this phase, air quality will be negatively impacted by gas (smoke) and dust emissions from the movement of machinery, vehicles, excavations, and equipment in general during decommissioning, as well as possible odors. These impacts are considered negative, of reduced magnitude, direct, probable, local, temporary, reversible, and insignificant.

Once decommissioned, the impacts caused by the infrastructure in terms of this descriptor will be reduced. This is a positive impact, of reduced magnitude, direct, certain, localized, temporary, reversible, and insignificant.

7.12 SOUND ENVIRONMENT

7.12.1 Construction phase

Increase in noise levels.

During the construction phase of the silos, it is considered that activities related to the movement of machinery, vehicles, generators, employees, and the assembly of the silos will cause an increase in noise levels.

In general, the impacts can be classified as negative, direct, moderate in magnitude, temporary, certain, widespread, reversible, and insignificant.

7.12.2 Operation phase

Increase in noise levels.

During the operation phase of the Silo Plant, the main actions likely to generate impacts on the sound environment stem from the activities and operations of the aforementioned facilities, namely grain logistics, transport and distribution, maintenance, generator operation, workers, etc.

The noise levels emitted by road transport are essentially composed of emissions from the propulsion system and the movement of vehicles on the road surface. Factors contributing to noise levels include, in addition to driving speed, vehicle type, tire type, pavement type, vehicle maintenance, vehicle age, road gradient, the presence or absence of noise barriers, and driving patterns.

The impacts on the sound environment will be felt to a greater extent during the night and are mainly associated with road traffic.

Therefore, it is expected that road traffic resulting from the operation of the Silos Plant will lead to negative impacts of moderate magnitude that are direct, probable, localized, permanent, reversible, and insignificant if mitigation measures are adopted.

On the other hand, at the start of normal operation, promote a campaign to monitor noise levels in order to assess the significance of the impact generated and/or the need to apply mitigation measures (e.g., noise barriers).

7.12.3 Decommissioning phase

Increase in noise levels.

During this phase, the movement of vehicles, machinery, and workers, as well as the noise caused during demolition, will have an impact. These impacts are considered negative, moderate in magnitude, direct, certain, local, temporary, reversible, and insignificant at this stage of the work.

Once decommissioned, the impacts caused by this descriptor are reduced. This is a positive impact, of moderate magnitude, direct, certain, local, temporary, reversible, and insignificant.

7.13 SOCIOECONOMICS

7.13.1 Construction phase

Job creation

In order to carry out the work, it will be necessary to resort to external and internal labor, which will constitute the workforce for the construction of the Silo Plant. Although this constitutes a very low risk very low probability, all situations of labor exploitation, discrimination at work, or the use of child labor must be prevented in order to avoid serious violations of the provisions of international conventions on the protection of the rights of children and workers to which Angola is a signatory through the International Labor Organization (ILO).

In this context, it is important to comply with the provisions of the AfDB's Integrated Safeguard System, namely Operational Safeguard 5.

The hiring of labor will have positive, direct, temporary, widespread, reversible, certain, small, and insignificant impacts.

Boosting related sectors

In general, at the socioeconomic level, the main impacts associated with the construction phase will result from the revitalization of associated sectors in the provision of raw material supply, construction, transportation, etc.

These impacts are positive, direct and indirect, temporary, widespread, reversible, probable, of reduced magnitude, and insignificant.

Disruption to local communities

Vehicle traffic and noise caused during the construction and assembly of silos may cause some inconvenience to the population living in the surrounding area. This impact can be classified as negative, of reduced magnitude, direct, probable, local and widespread, temporary, reversible, and insignificant.

Risks of accidents involving the population

Vehicle traffic during the construction and assembly of the silos may increase the risk of accidents involving the population living in the surrounding area. This impact can be classified as negative, moderate, direct, uncertain, local and widespread, temporary, reversible and irreversible (in the event of death), insignificant to very significant (in the event of death).

7.13.2 Operation phase

Job creation

The main positive impacts of the project will be felt with the start of the operation phase and, given the nature of the investment in the region's infrastructure, will extend beyond the municipal and provincial levels.

For the Silos Center to operate, it will be necessary to hire external and internal labor to constitute the workforce. Although the risk is very low, all situations of labor exploitation, discrimination at work, or the use of child labor must be prevented in order to avoid serious violations of the provisions of international conventions on the protection of the rights of children and workers to which Angola is a signatory through the International Labor Organization (ILO).

In this context, it is important to comply with the provisions of the AfDB's Integrated Safeguard System, namely Operational Safeguard 5.

Thus, it is expected that the hiring of labor will create a positive, direct, certain, broad, permanent, immediate, moderate, irreversible, and significant impact (due to the lack of local employment).

Boosting related sectors

The operation of the Silo Plant will leverage local economic development and the creation of indirect jobs associated with economic activities complementary to the Silo Plant's activity.

In general, at the socioeconomic level, the main impacts associated with the silos' operational phase will generate benefits and will be related to the use of service providers, transport companies, and suppliers of locally and nationally produced foodstuffs. The impacts are considered to be positive, moderate in magnitude, indirect (stimulation of associated sectors), probable, widespread (grain distribution and export), irreversible, temporary and permanent, and significant.

Nuisance to the population

Vehicle traffic and noise caused during the distribution of products and purchase of various inputs may cause some inconvenience to the population living in the surrounding area.

where these means circulate. This impact can be classified as negative, of moderate magnitude, direct, uncertain, local and widespread, permanent, reversible, and insignificant.

Risks of accidents involving the population

The circulation of vehicles and motorcycles during the distribution of products and acquisition of various inputs may lead to an increased risk of accidents involving the population. This impact can be classified as negative, moderate, direct, uncertain, localized and widespread, permanent, reversible and irreversible (in the event of death), immediate, insignificant and significant (in the event of death).

7.13.3 Decommissioning phase

Reduction in the dynamism of associated sectors and unemployment

During this phase, there may be an increase in unemployment and a decrease in the income of the community and all those who depended on these facilities to conduct their business. This is a negative impact of moderate magnitude, direct and indirect, certain, local and regional, permanent, reversible, and significant.

Job creation

To carry out the work, it will be necessary to resort to external and internal labor, which will constitute the workforce for the decommissioning of the Silos Plant. Although the risk is very low, all situations of labor exploitation, discrimination at work, or the use of child labor must be prevented in order to avoid serious violations of the provisions of international conventions on the protection of the rights of children and workers to which Angola is a signatory through the International Labor Organization (ILO).

In this context, it is important to comply with the provisions of the AfDB's Integrated Safeguard System, namely Operational Safeguard 5.

The decommissioning of these infrastructures may create employment opportunities or possible employment in their reuse.

This is a positive impact, of reduced magnitude, direct, certain, local, temporary, reversible, and insignificant.

Risks of accidents involving the population

Vehicle traffic during the decommissioning and dismantling of the silos may increase the risk of accidents involving the population living in the surrounding area. This impact can be classified as negative, moderate, direct, probable, local and regional, temporary, reversible and irreversible (in the event of death), insignificant to significant.

7.14 URBAN INFRASTRUCTURES

7.14.1 Construction phase

Pressure on the road network

With regard to this descriptor, it is considered that the impacts during the construction phase will mainly affect the road network, specifically the EN-250 national road, due to the transport of construction support equipment, and tertiary roads, due to the movement of machinery, vehicles, and workers.

However, it is considered that this impact, although negative, is of low magnitude, direct, uncertain, localized, temporary, reversible, and insignificant.

Pressure on the energy, water, and sanitation supply network

At this stage, it is considered that there will be no impact on these sectors, since the facilities will have their own autonomous systems.

7.14.2 Operational phase

Pressure on the road network

Due to the transport of inputs and distribution of stored grain, it is considered that there will be impacts due to the use of the EN-250 national road network and tertiary roads. It is not considered that the normal operation of the Silo Plant will generate significant traffic on the access roads, and as such no significant impacts are expected.

The impacts are considered to be negative, of low magnitude, direct, uncertain, widespread, permanent, reversible, and insignificant.

Pressure on the energy, water, and sanitation supply network

It is also expected that during the operational phase, activities related to electricity and water consumption and the generation of solid and liquid waste may put pressure on the public distribution network infrastructure (if the Silos Plant is connected to the network). However, the production of liquid effluents and consumption of drinking water is not expected to put pressure on public infrastructure, as the facilities will have their own autonomous effluent and drinking water storage system.

The impacts are considered to be negative, of low magnitude, direct, unlikely, local, permanent, reversible, and insignificant.

Reduction in grain transport time due to proximity to the EN-250

At this stage, it is considered that the location of the Silo Plant near the EN-250 could reduce grain reception and transport time.

The impact is considered to be positive, moderate in magnitude, direct, probable, regional, permanent, irreversible, and very significant.

7.14.3 Decommissioning phase

Pressure on the road network

During this phase, there will be an increase in traffic intensity on the roads serving the area where the Silos Plant is located, with a consequent increase in the probability of road accidents and road degradation during decommissioning due to the transport of equipment and waste resulting from demolition and excavation.

This is considered a negative impact, of low magnitude, direct, certain, widespread, permanent, reversible, and significant.

Once decommissioned, it reduces the impacts caused by the Silos Plant in terms of this descriptor. It is a positive impact, of low magnitude, direct, certain, local, temporary, reversible, and insignificant.

7.15 WASTE PRODUCTION, CONTROL, AND MANAGEMENT

7.15.1 Construction phase

Waste production

It is considered that during the construction of the metal silos, various types of waste will be generated, including inert waste such as rubble and scrap metal, hazardous waste such as oils, greases, paints, and solvents, organic waste from workers' food scraps, and recyclable waste such as plastics, cardboard, and packaging.

There may also be liquid waste resulting from the use of changing rooms and the maintenance and cleaning of the facilities.

At this stage, they are considered negative, of reduced magnitude, direct, certain, localized, permanent, reversible, and insignificant.

Risks of environmental contamination

It is considered that the incorrect storage and disposal of solid and liquid waste may cause a risk of environmental contamination.

At this stage, they are considered negative, of reduced magnitude, direct and indirect, probable, localized, temporary, reversible, and insignificant.

Proper management of this waste will be essential to minimize environmental impact during construction.

7.15.2 Operation phase

Waste production

During this phase, various types of waste will be produced as a result of grain deterioration, office waste, cafeteria waste, maintenance area waste, facility cleaning waste, etc.

This will mainly consist of cardboard, plastic packaging, cans, plastic bottles, food scraps, PETs, lubricating oils, damaged parts, effluents from the changing rooms, etc.

The impacts considered in this phase are negative, of reduced magnitude, direct, certain, localized, permanent, irreversible, and significant to slightly significant, subject to the adoption of mitigation measures.

Risks of environmental contamination

It is considered that the incorrect storage and disposal of solid and liquid waste may cause a risk of environmental contamination. At this stage, these risks are considered to be negative, of reduced magnitude, direct and indirect, probable, localized, permanent, reversible, and insignificant.

The development and implementation of a Waste Management Plan is essential to prevent incidents.

7.15.3 Decommissioning phase

Waste production

At this stage, large quantities of waste may be produced, whether solid, liquid, etc. Therefore, very specific measures must be taken regarding its collection and final destination. At this stage, they are considered negative, moderate in magnitude, direct, probable, localized, temporary, reversible, immediate, and significant.

Once decommissioned, the impacts caused by the Silo Plant in terms of waste production are reduced. This is a positive impact, of reduced magnitude, which is direct, certain, localized, permanent, reversible, and insignificant.

Risks of environmental contamination

It is considered that the incorrect storage and disposal of solid and liquid waste may cause a risk of environmental contamination. At this stage, they are considered negative, of reduced magnitude, direct and indirect, probable, localized, temporary, reversible, and insignificant.

Proper management of this waste will be essential to minimize environmental impact during construction.

7.15.4 LAND USE PLANNING

7.15.5 Construction phase

The actions necessary for the construction of the silos are compatible with the provisions of the Spatial Planning and Urban Development Law (Law No. 3/2004, of June 25), namely with the provisions of Article 42(b). They are also compatible with the provisions of the Land Law (Law No. 9/04 of November 9), namely in its Article 68, paragraph a.

7.15.6 Operational phase

The project ensures compliance with the various land management instruments in force in the area of implementation.

However, there will only be a negative impact if authorization has not been requested from the municipal or communal administration regarding the project's framework.

7.15.7 Decommissioning phase

The actions necessary for the decommissioning of the Silo Plant must comply with the provisions of the Spatial Planning and Urban Development Law (Law No. 3/2004 of June 25), as well as other related laws.

7.16 HISTORICAL AND CULTURAL HERITAGE

Given that no classified heritage sites have been identified in the directly affected area and in the immediate vicinity of the site, no impacts are expected to directly affect this descriptor, either during the construction, operation, or decommissioning phases.

7.17 ANALYSIS OF THE VULNERABILITY OF THE "SILOS" PROJECT TO THE EFFECTS OF CLIMATE CHANGE

The project falls under Category 2 according to the Bank's Climate Safeguards system. This indicates that the project has moderate vulnerability to climate change, requiring an analysis of the risks associated with climate change and the implementation of adaptation measures.

Climate change has been a global concern, with significant effects on food security, water availability, and increased frequency of extreme weather events. Angola, due to its geographical location and dependence on agriculture, is particularly vulnerable to these impacts. Among the main challenges facing the country are prolonged drought, soil erosion, changes in rainfall patterns, and rising temperatures, factors that directly affect agricultural production and the food security of the population.

Angola, despite its low contribution to global warming, is among the nations most impacted by climate change due to the vulnerability of its ecosystems. The effects include increased aridity and recurrence of droughts, intensification of saline intrusion and deterioration of underground water reserves, soil degradation and loss of biodiversity, as well as an increase in the frequency and intensity of tropical storms, among others.

The project to build silos in Balombo aims to improve the conservation and storage of cereals, reducing post-harvest losses and ensuring greater stability in food supply. However, to ensure its effectiveness and sustainability, it is essential to analyze its vulnerability to climate change:

- **Water security:** Water scarcity can affect the grain drying process and storage efficiency, especially during prolonged periods of drought.
- **Impact on infrastructure:** High temperatures and heavy rains can compromise the structure of silos, accelerating the degradation of materials and increasing maintenance costs.

- **Effects on agricultural production:** Reduced production of corn, rice, beans, soybeans, and other types of grains due to climate change can impact the use of silos, reducing the project's operational efficiency.
- **Need for adaptation:** Measures such as the construction of rainwater harvesting systems, the use of heat-resistant materials, and the adoption of climate monitoring systems are essential to mitigate the impacts.

To address these challenges, Angola is committed to several international agreements on climate change, including:

- Paris Agreement (2015): Angola has made commitments to reduce greenhouse gas emissions and adapt to climate change by promoting the resilience of agricultural systems.
- United Nations Framework Convention on Climate Change (UNFCCC): The country has developed national climate adaptation plans to mitigate negative impacts.
- United Nations Environment Programme (UNEP): Angola participates in initiatives for the sustainable use of natural resources and the protection of biodiversity.

With regard to other extreme weather events, such as temperature variations, heat islands, heavy rains, tropical storms, landslides, and periods of severe drought, there are still no studies that allow for concrete predictions, and there is great uncertainty about these projections.

All efforts to build sustainable infrastructure were a fundamental requirement to ensure the absorption, reduction, or prevention of emissions that this project seeks to achieve in the operational phase.

The Balombo silo project is essential to ensuring food security, but it faces risks due to climate change. To ensure its viability and longevity, it is crucial to integrate climate adaptation measures, such as infrastructure improvements, flood control, water harvesting, wastewater treatment and reuse, and constant monitoring of environmental and social impacts. Adherence to international commitments reinforces the need for sustainable strategies that ensure the project's resilience in the face of climate challenges.

7.18 SUMMARY OF ENVIRONMENTAL IMPACTS

The following table presents a summary of environmental and social impacts, consisting of a final assessment that summarizes and classifies the main impacts identified during the environmental and social impact assessment (ESIA). At this stage, the negative and positive impacts on the environment resulting from the project activities are analyzed according to environmental factors, in relation to the criteria used to assess the impacts (magnitude, duration, incidence, probability, etc.) and their scale (section 7.1), without assigning a numerical value to their significance. Climate change not caused by the project, but rather globally by potential climate change that could have impacts at the national level, was also included in this summary.

Table 48: Summary of environmental impacts (construction phase)

Descriptor	Impact	Phase	Activity/area affected	Impact characteristics
Climate	Change in evapotranspiration at ground level	Construction	Clearing and earthmoving (demolition), installation and use of the construction site, construction of the silo plant	Negative, direct, reduced magnitude, temporary, and permanent operation), reversible and irreversible operation), unlikely, localized and insignificant.
Geology/ Geomorphology	Changes in local geomorphology (caused by excavation excavation and landfill works)	Construction	Clearing and earthmoving (blasting), installation and use of the construction site, construction of the Silo Plant	Negative, direct, low magnitude, temporary, irreversible, certain, localized, and insignificant.
Soils	Risks of soil contamination (concrete, oil, and fuel resulting from accidental spills) Soil compaction (due to the movement of machinery, equipment, and personnel)	Construction	Clearing of land, soil movement, and handling of hazardous products and effluents.	Negative, direct, reduced magnitude, temporary, reversible, probable, localized, and insignificant.
Land use	Change in land use	Construction	Project area	Negative, direct, low magnitude, temporary, reversible, certain, local and insignificant.
Groundwater resources	-Contamination of the aquifer by accidental spills and/or runoff of waste -Decreased recharge of surface aquifers	Construction	Clearing and earthmoving (blasting), installation and use of the construction site	Negative, direct and indirect, low magnitude, temporary, reversible, unlikely, localized, and insignificant.
Surface water resources	-Impact on surface water drainage patterns (resulting from soil compaction and sealing); -Contamination of waterways by accidental spills and/or runoff of waste.	Construction	Construction of buildings and infrastructure, transport of people and materials	Negative, direct, low magnitude, temporary (contamination) and permanent, reversible, probable (contamination) and uncertain (alteration of runoff), local and insignificant.
Flora and Fauna	-Disturbance and dusting of surrounding flora; -Running over and killing of species; -Disturbance of local fauna	Construction	Cleaning, excavation, and earthworks; installation and use of construction sites; construction of buildings and infrastructure; transportation of people and materials	Negative, direct and indirect, low magnitude, temporary (construction), reversible and irreversible (in the case of wildlife death), certain, localized, and insignificant.
Landscape	Change in the character of the landscape with the introduction of buildings (spatial and functional disorganization of the territory, introduction of "foreign" elements)	Construction	Project area and surroundings	Negative, direct, moderate magnitude, temporary, irreversible, certain, localized, and insignificant.

Descriptor	Impact	Phase	Activity/affected area	Impact characteristics
Air Quality	Emissions of gases and particulate matter (dust) from excavation and landfill activities	Construction	Cleaning and stripping of soil, earthworks; demolition; Installation and use of the construction site; construction of the building and infrastructure; transportation of people and materials	Negative, direct, low magnitude, temporary, reversible, certain, local and insignificant.
	Increased concentration of CO and NOx from road traffic	Construction	Area surrounding the project	Negative, indirect, small in scale, temporary, reversible, uncertain, localized, and insignificant.
Noise environ ment	Increased noise levels (from vehicle traffic vehicles, mostly heavy vehicles assigned to the construction site, and from the operation of machinery and equipment)	Construction	Cleaning and stripping of the soil, earthworks, demolition, installation and use of the construction site, construction of the building and infrastructure, transportation of people and materials, etc.	Negative, direct, moderate, temporary, reversible, certain, widespread, and significant.
Socioeconomic	Nuisance to the local population (caused by noise and dust emissions, disruption to traffic flow)	Construction	Cleaning and stripping of soil, earthworks, demolition, installation and use of the construction site, construction of the building and infrastructure, transportation of people and materials, etc.	Negative, indirect, small in scale, temporary, reversible, probable, widespread, and insignificant.
	Job creation	Construction	Project surrounding area and area of direct and indirect influence	Positive, direct, low magnitude, temporary, reversible, certain, widespread and insignificant.
	Boosting of associated sectors of activity	Construction	Project area and area of direct and indirect influence	Positive, direct and indirect, low magnitude, temporary, reversible, probable, widespread and insignificant.
	Risk of accidents (accidents that involve workers and the general public) workers and population)	Construction	Project surrounding area and area of direct and indirect influence	Negative, direct and indirect, low to moderate magnitude, temporary, reversible, uncertain, widespread, and insignificant.
	Increased population retention, especially among the working-age population working age	Operation	Project surrounding area and area of direct influence	Negative, indirect, small in scale, temporary, reversible, probable, localized, and insignificant.
	Gender inequality in the workplace, sexual harassment, gender-based violence	Construction	Project surrounding area and area of direct influence	Negative, indirect, low magnitude, temporary, reversible, Probable, localized, and insignificant.
Infrastructure	Pressure on the EN 250 road network	Construction	Project area	Negative, direct, low magnitude, temporary, reversible, unlikely, local and widespread, insignificant.
	Pressure on the energy, water, and sanitation supply network sanitation	Construction	Project area	Negative, direct, low magnitude, temporary, reversible, unlikely, localized, and insignificant.
Waste	Waste production	Construction	Project area	Negative impact, direct, small in magnitude, temporary, reversible, certain, localized, and insignificant.
	Risks of environmental contamination	Construction	Project area and surroundings	Negative impact, direct, low magnitude, temporary, reversible, probable, localized, and insignificant.
Climate change	Temperature variations, heat islands, rise in average sea level, heavy rainfall, storms, floods, landslides, and extreme drought events (not caused by the project, but by potential climate change)	Construction	Project area and surroundings	Negative impact

Table 49: Summary of environmental impacts (operation phase)

Descriptor	Impact	Phase	Activity/affected area	Impact characteristics
Climate	Increased perception of heat discomfort	Operation	Silo Plant Operation	Negative, direct, reduced magnitude, permanent, irreversible Operation, unlikely, localized, and insignificant.
Geology/ Geomorphology	Changes in local geomorphology	Operation	Operation of the Silo Plant	Negative, direct, low magnitude, permanent, irreversible, certain, localized, and insignificant.
Soils	Risks of soil contamination (oils and fuels resulting from accidental spills) Soil compaction (due to the movement of trucks, equipment, and personnel)	Operation	Handling of hazardous products and effluents, transport of grain and personnel	Negative, direct, low magnitude, permanent, reversible, probable, localized, and insignificant.
Land use	Change in land use	Operation	Project area	Negative, direct, low magnitude, permanent, irreversible, certain, local and insignificant.
Groundwater resources	-Contamination of the aquifer by accidental spills and/or runoff of waste -Decreased recharge of surface aquifers	Operation	Compaction due to light and heavy vehicle traffic, impermeable areas during construction	Negative, indirect, reduced magnitude, temporary, reversible, unlikely, localized, and insignificant.
Surface water resources	-Impact on surface water drainage patterns (resulting from soil compaction and sealing); -Contamination of waterways by accidental spills and/or runoff of waste.	Operation	Circulation of light and heavy vehicles, poor management of chemicals	Negative, direct, reduced magnitude, temporary (contamination) and permanent, reversible, probable (contamination) and uncertain (alteration of runoff), local and insignificant.
Flora and Fauna	-Disturbance and dusting of surrounding flora; -Running over and killing of species; -Disturbance of local fauna	Operation	Cleaning and maintenance of facilities, circulation of light and heavy vehicles, operation of facilities	Negative, direct and indirect, reduced magnitude, permanent, reversible and irreversible (in the case of fauna death), certain, localized, and insignificant.
Landscape	Change in the character of the landscape	Operation	Project area and surroundings	Negative, direct, moderate in magnitude, permanent, irreversible, certain, localized, and significant.
Air Quality	Emissions of gases and particulate matter	Operation	Use of generators, cleaning of facilities, circulation of light and heavy vehicles.	Negative, direct, low magnitude, temporary and permanent, reversible, certain, local and insignificant.
	Increased concentration of CO and NOx from road traffic	Operation	Area surrounding the project	Negative, indirect, low magnitude, permanent, reversible, uncertain, localized, and insignificant.

Descriptor	Impact	Phase	Activity/area affected	Impact Features
Noise **Noise**	Increased noise levels	Operation	Operation of silos, maintenance of facilities, movement of vehicles and employees	Negative, direct, moderate, temporary, reversible, certain, extensive and significant.
Socioeconomic	Nuisances for the local population (caused by noise and dust emissions, traffic flow constraints)	Operation	Operation of silos, maintenance of facilities, movement of vehicles and employees	Negative, indirect, low magnitude, temporary, reversible, probable, widespread, and insignificant.
	Job creation	Operation	Project surrounding area and area of direct and indirect influence	Positive, direct, small in scale, temporary, reversible, certain, widespread, and insignificant.
	Boosting of associated sectors of activity	Operation	Project area and area of direct and indirect influence	Positive, direct and indirect, low magnitude, temporary, reversible, probable, widespread and insignificant.
	Risk of accidents (accidents involving workers and the population)	Operation	Project surrounding area and area of direct and indirect influence	Negative, direct and indirect, moderate magnitude, temporary, reversible and irreversible (in case of death), uncertain, widespread and insignificant.
	Increased population settlement, especially among the working-age population working age	Operation	Project surrounding area and area of direct influence	Negative, indirect, small in scale, temporary and permanent, reversible, probable, localized, and insignificant.
	Gender inequality and in the workplace, sexual harassment, gender-based violence	Operation	Project surrounding area and area of direct influence	Negative, indirect, low magnitude, permanent, reversible, Probable, localized, and insignificant.
Infrastructure	Pressure on the road network	Operation	Project area	Negative, direct, reduced magnitude, permanent, reversible, unlikely, local and widespread, insignificant.
	Pressure on the energy, water, and sanitation supply network sanitation	Operation	Project area	Negative, direct, low magnitude, permanent, reversible, unlikely, localized and widespread. and insignificant.
	duction in grain drainage time due to proximity to EN-250	Operation	Project Area	Positive, direct, moderate magnitude, permanent, irreversible, probable, regional and very significant.
Waste	Waste production	Operation	Project area	Negative impact, direct, small in magnitude, permanent, irreversible, certain, localized, and insignificant.
	Risks of environmental contamination	Operation	Project area and surroundings	Negative impact, direct, low magnitude, temporary, reversible, probable, localized, and insignificant.
Climate change	Temperature variations, heat islands, rise in average sea level, heavy rainfall, storms, floods, landslides, and extreme drought events (not caused by the project, but by potential climate change)	Construction and operation	Project area and surroundings	Negative impact

Table 50: Summary of environmental impacts (decommissioning phase)

Descriptor	Impact	Phase	Activity/area affected	Impact characteristics
Climate	Change in evapotranspiration at ground level	Decommissioning	Restoration of degraded areas after decommissioning	Positive, reduced magnitude, direct, probable, localized, permanent or temporary, reversible, and insignificant.
Geology/geomorphology	Changes to local geomorphology (caused by excavation and landfill works)	Decommissioning	Cleaning and earthmoving, excavations for the removal of structural foundations	Negative, direct, temporary, localized, probable, immediate, irreversible, and insignificant.
Soils	Risks of soil contamination (oils, fuels, and effluent) resulting from accidental spills Soil compaction (due to the movement of machinery, equipment, and personnel)	Decommissioning	Cleaning and earthmoving, excavations for the removal of structural foundations, movement and handling of hazardous products and effluents.	Negative, magnitude reduced, direct, probable, local, temporary, reversible, immediate, and insignificant.
	Return of the soil to its undisturbed state			Positive, magnitude reduced, direct, probable, localized, permanent, reversible, medium and long term, and insignificant.
Land use	Change in land use (return to its natural state prior to the construction of the silo facility)	Decommissioning	Project area	Positive, magnitude reduced, direct, probable, localized, permanent, reversible, medium and long term, and insignificant.
Groundwater resources	-Contamination of the aquifer by accidental spills and/or runoff of waste -Decreased recharge of surface aquifers	Decommissioning	Cleaning and earthmoving, excavations for the removal of structural foundations, movement and handling of hazardous products and effluents.	Negative, reduced magnitude, direct, probable, local, temporary, reversible, and insignificant
	Gradual return to undisturbed surface water drainage patterns of surface water.		Recovery of degraded areas	Positive, low magnitude, direct, probable, local, temporary, reversible, and insignificant reversible, and insignificant
Surface water resources	-Impact on surface water drainage patterns -Contamination of watercourses by accidental spills and/or waste runoff.	Decommissioning	Cleaning and earthmoving, excavation for removal of structural foundations, movement and handling of hazardous products and effluents.	Negative, reduced magnitude, direct, probable, local, temporary, reversible, and insignificant
	Gradual return to undisturbed surface water drainage patterns of surface water.		Recovery of degraded areas	Positive, reduced magnitude, direct, probable, local, temporary, reversible, and insignificant
Flora and Fauna	-Disturbance and dusting of surrounding flora; -Running over and killing of species; -Disturbance of local fauna	Decommissioning	Cleaning and earthmoving, demolition, and excavation for the removal of structural foundations	Negative, direct and indirect, reduced magnitude, temporary, reversible and irreversible (in the case of fauna death), certain and probable, localized and insignificant.
	Gradual return to undisturbed patterns of fauna and flora		Recovery of degraded areas and reforestation	Positive, reduced magnitude, direct, certain and probable, localized, temporary, reversible, and insignificant

Descriptor	Impact	Phase	Activity/area affected	Impact characteristics
Landscape	Change in the character of the landscape (spatial and functional disorganization)	Deactivation	Project area and surroundings	Negative, low and high magnitude (in the case of abandonment), direct, certain, local, temporary, and permanent (in the case of abandonment), reversible, immediate, and insignificant
	Gradual return of the landscape to its undisturbed state			Positive, reduced magnitude , direct, probable, localized, temporary, reversible, insignificant
Air Quality	Emissions of gases and particulate matter (dust) originating from excavation and landfill activities	Decommissioning	Cleaning and earthmoving, demolition, and excavation for the removal of structural foundations	Negative, low magnitude, direct, probable, local, temporary, reversible, and insignificant.
	Increased concentration of CO and NOx from road traffic			
	Elimination of sources of air pollution		Project area and surroundings	Positive, magnitude reduced, direct, certain, localized, temporary, reversible, and insignificant
Noise environ ment	Increased noise levels (from vehicle traffic, mostly heavy vehicles involved in the construction work)	Deactivation	Cleaning and earthmoving, demolition, and excavation for the removal of structural foundations	Negative, moderate magnitude, direct, certain, local, temporary, reversible, insignificant.
	Elimination of noise sources		Project area and surroundings	Positive, moderate magnitude, direct, certain, local, temporary, reversible, and insignificant.
Socioeconomic	Nuisance to the local population (caused by noise and dust emissions, traffic flow constraints)	Deactivation	Cleaning and earthmoving, demolition and excavation for the removal of structural foundations	Negative, reduced magnitude, direct, probable, local and widespread, temporary, reversible, and insignificant.
	Job creation	Decommissioning	Project surrounding area and area of direct and indirect influence	Positive, direct, reduced magnitude, temporary, reversible, certain, widespread, and insignificant.
	Boosting of associated sectors of activity	Decommissioning	Project surrounding area and area of direct and indirect influence	Negative, moderate magnitude, direct and indirect, certain, local and regional, permanent, reversible, and significant.
	Risk of accidents (accidents involving workers and the population)	Decommissioning	Project surrounding area and area of direct and indirect influence	Negative, moderate, direct, probable, local and regional, temporary, reversible and irreversible (in case of death), insignificant to significant.
	Increase in the number of unemployed people	Decommissioning	Project area and area of direct and indirect influence	Negative, direct, reduced magnitude, permanent, reversible, certain, extended, and insignificant.
	Return gradual to unaffected uninterrupted of populations			Positive, direct, small in scale, temporary, reversible, Probable, widespread and insignificant.
Infrastructure	Pressure on the EN 250 road network	Deactivation	Project area and surroundings	Negative, reduced magnitude, direct, uncertain, widespread, temporary, reversible, and insignificant.
	Reduction of pressure on the road network, energy supply energy, water, and sanitation	Deactivation	Project area and surroundings	Positive, reduced magnitude , are direct, certain, extended, permanent, reversible, and insignificant

Descriptor	Impact	Phase	Activity/area affected	Impact characteristics
Waste	Waste production	Decommissioning	Cleaning and earthmoving, demolition, and excavation for the removal of structural foundations	Negative, moderate magnitude , direct, certain, localized, temporary, reversible, immediate, and significant.
	Risks of environmental contamination	Decommissioning	Inadequate cleaning and storage of waste, handling and handling of hazardous products and effluents.	Negative, moderate magnitude , direct, certain, localized, temporary, reversible, immediate, and significant.
	Elimination of the impacts caused by the Silo Plant in terms of waste production	Decommissioning	Project area and surroundings	Positive, low magnitude, direct, certain, localized, permanent, reversible, and insignificant
Climate Change	Temperature variations, heat islands, rise in average sea level, heavy rainfall, storms, floods, landslides, and extreme drought events (not caused by the project, but by potential climate change)	Decommissioning	Project area and surroundings	Negative impact

7.19 CLASSIFICATION OF ENVIRONMENTAL AND SOCIAL IMPACTS IN TERMS OF THEIR SIGNIFICANCE

The classification regarding the significance of environmental and social impacts is obtained by multiplying the criteria Probability (P), Incidence (I), Magnitude (M), and Duration (T) established in section 7.1.1, taking into account the values assigned to them in Table 42.

The following section presents summary tables of the classification of environmental and social impacts for each impact described, its assessment, and mitigating or enhancing measures. The indication of general and specific measures is in accordance with the code indicated in Chapter 8.

The tables do not exhaust the assessment of impacts, but are intended only to present, in a systematic and expeditious manner, the impacts that were considered, the significance values assigned, and the measures proposed, considering the construction and operation phases.

It should be noted that the impacts caused by the location of the construction site were not taken into account, as its location is unknown, nor were the impacts generated during the decommissioning phase, as they will be similar to those expected to occur during the construction phase.

Table 51: Classification of the environmental and social impacts of the project (construction phase)

DESCRIPTION	IMPACT	NATURE	OCCURRENCE	MAGNITUDE	DURATION	REVERSIBILITY	PROBABILITY	INCIDENCE	MITIGATION MEASURES	SIGNIFICANCE
Climate	Change in evapotranspiration and temperature at ground level	-	D	R	T	RV	PR	L	MGC 1/ MMC 1	-3
Geology and Geomorphology	Changes in local geomorphology	-	D	R	T	IR	C	L	MGC 1/MMC 2	-8
Soil	Soil compaction, contamination, and erosion	-	D	R	T	RV	PR	L	MGC 1/MMC 3,4,5	-3
Land use	Land use change	-	D	R	T	RV	PR	L	MGC 1	-3
Surface water resources Surface water	Contamination of waterways by accidental spills and/or waste runoff	-	D	R	T	RV	PR	L	MGC1/MMC 6,7,8	-3
Underground Ground water	Contamination of the aquifer by accidental spills and/or runoff of waste	-	IND	R	T	RV	IMP	L	MGC 1/MMC 9,10,11	-1
Flora	Disturbance and destruction of flora	-	D	R	R	RV	PR	L	MGC 1/MMC 12,13,14	-3
Wildlife	Risks of species being run over and killed	-	D	R	T	IR	IC	A	MMC 16	-8
	Disturbance of local fauna	-	D	R	T	RV	PR	L	MMC 15	-3
	Barrier effect on the circulation of terrestrial fauna	-	D	R	P	IR	IMP	L	SM	-2

DESCRIPTION	IMPACT	NATURE	OCCURRENCE	MAGNITUDE	DURATION	REVERSIBILITY	PROBABILITY	INCIDENCE	MITIGATION MEASURES	SIGNIFICANCE
Landscape	Landscape alteration	-	D	M	T	RV	C	L	MGC 1/MMC 17,18,21	-8
Air quality	Emissions of gases and particulate matter	-	D	R	T	RV	C	L	MGC 14:11 MMC 20:21,22,23	-4
Noise environment	Increased noise levels	-	M	R	T	RV	C	A	MGC 11.14 MMC 24:25,26	-16
Socioeconomics	Job creation	+	D	R	T	RV	C	A	MGC 6.8/MMC 27	8
	Dynamization of sectors of activity	+	IND	R	T	RV	PR	A	MGC 2,6,8/MMC 28	6
	Nuisance to local residents (vehicle traffic, noise, dust)	-	D	R	T	RV	PR	A	MGC 2,6,8/MMC 29	-6
	Accident risks	-	D	M	T	RV	IC	A	MGC 4, 6, 8, 12, 14 MMC 30,31	-8

DESCRIPTION	IMPACT	NATURE	OCCURRENCE	MAGNITUDE	DURATION	REVERSIBILITY	PROBABILITY	INCIDENCE	MITIGATION MEASURES	SIGNIFICANCE
Infrastructure	Pressure on the road network	-	D	R	T	RV	IC	A	MMC 32, 33, 34, 35	-4
Waste	Waste production	-	D	R	P	RV	C	L	MGC 3.10/MMC 39	-8
	Risks of environmental contamination	-	IND	R	T	RV	PR	L	MGC 3 MMC 36, 37, 38	-3

Nature: Positive (+), Negative (-)
Occurrence: Direct (D), Indirect (Ind)
Magnitude: Reduced (R), Moderate (M), High (E) **Incidence:** Local (L), Extended (E), Regional (RE) **Duration:** Temporary (T), Permanent (P) **Reversibility:** Reversible (Rv.), Irreversible (Ir)
Probability of occurrence: Improbable (IMP), Uncertain (INC), Probable (PR), Certain (C)
Significance: Very Significant (VS), Significant (S), Not Significant (NS) GCM-general measures for the construction phase
MMC-specific mitigation measure for the construction phase
SM-No measure

Table 52: **Identification and assessment of the project's environmental impacts (operation phase)**

DESCRIPTION	IMPACT	NATURE	OCCURRENCE	MAGNITUDE	DURATION	REVERSIBILITY	PROBABILITY	INCIDENCE	MITIGATION MEASURES	SIGNIFICANCE
Climate	Increased perception of heat discomfort	-	D	R	P	R	IMP	L	MMO 1	-2
Geology and Geomorphology	Changes in local geomorphology	-	D	R	P	IR	C	L	MMO 2.3	-16
Soil	Risk of soil contamination from accidental spills	-	D	R	T	RV	PR	L	MGO 2/MMO 5.6	-3
	Compaction due to the movement of people and vehicles	-	D	R	P	RV	PR	L	MMO 3	-6
Land use	Land use change	-	D	R	P	IR	C	L	SM	-16
Surface water resources Surface water	Contamination of waterways by accidental spills and/or waste runoff	-	D	R	T	RV	PR	L	MGO 2/MMO 7.8	-3
	Impact on surface water drainage patterns and increased runoff	-	D	R	P	RV	PR	L	MMO 9	-6

DESCRIPTION	IMPACT	NATURE	OCCURRENCE	MAGNITUDE	DURATION	REVERSIBILITY	PROBABILITY	INCIDENCE	MITIGATION MEASURES	SIGNIFICANCE
Water resources Ground water	Contamination of aquifer by accidental spills and/or runoff of waste	-	IND	R	T	RV	IC	L	MGO 2/MMO 11	-2
	Possible decrease in local water table	-	IND	R	P	IR	IMP	L	SM	-8
Flora	Disturbance and dusting of surrounding flora	-	D	R	P	RV	PR	L	MGO 1/ MMO 12, 13, 14, 15, 16	-6
Wildlife	Roadkill and death of species	-	IND	R	P	IR	IC	L	MGO 1/ MMO 6, 20, 21, 22	-8
	Disturbance of local fauna	-	IND	R	P	IR	IC	L	MGO 1.10/MMO 17, 18, 21, 22	-8
Landscape	Change in the character of the landscape with the introduction of buildings and landscaping	-	D	M	P	IR	C	L	MMO 23, 24, 25, 26	-32
Air quality	Emissions of gases and particulate matter	-	D	M	P	RV	C	L	MGO 7.9/MMO 27, 28, 29, 30, 31, 32	-16
Noise environment	Increased noise levels	-	D	M	P	RV	PR	L	MGO 7.9/MMO 33, 34, 35, 36	-12

DESCRIPTION	IMPACT	NATURE	OCCURRENCE	MAGNITUDE	DURATION	REVERSIBILITY	PROBABILITY	INCIDENCE	MITIGATION MEASURES	SIGNIFICANCE
Socioeconomics	Job creation	+	D	M	P	-------	C	A	MGO 8/MMO 39	32
	Revitalization of sectors of activity	+	IND	M	P	RV	PR	R	MMO 38, 37, 40	36
	Nuisance to the population (vehicle traffic, noise, dust)	-	D	M	P	RV	PR	L	MGO 8/ MMO 41	-12
	Risks of accidents involving the population	-	D	M	P	RV	IC	A	MGO 2/MMO 43,44,45	-16
Infrastructure	Pressure on the road network	-	D	R	P	RV	IC	A	MMO 49	-8
	Pressure on the energy, water, and sanitation supply network	-	D	R	P	RV	IC	A	MMO 50,51,52	-8
	Reduction in grain transport time due to proximity to the EN-250 highway	+	D	M	P	IR	PR	R	SM	72

DESCRIPTION	IMPACT	NATURE	OCCURRENCE	MAGNITUDE	DURATION	REVERSIBILITY	PROBABILITY	INCIDENCE	MITIGATION MEASURES	SIGNIFICANCE
Waste	Waste production	-	D	R	P	IR	C	L	MGO 3.7.9/MMO 53.55	-16
	Risks of environmental contamination	-	D	R	P	RV	PR	L	MGO 2,3,7,9/MMO 54,55,56	-6

Nature: Positive (+), Negative (-)
Occurrence: Direct (D), Indirect (Ind)
Magnitude: Reduced (R), Moderate (M), High (E) **Incidence:** Local (L), Extended (E), Regional (RE) **Duration:** Temporary (T), Permanent (P) **Reversibility:** Reversible (Rv.), Irreversible (Ir)
Probability of occurrence: Improbable (IMP), Uncertain (INC), Probable (PR), Certain (C)
Significance: Very Significant (VS), Significant (S), Not Significant (NS) MGO-general measures for the operational phase
MMO-specific mitigation measure for the operational phase
SM-No measure

8 MITIGATION MEASURES

8.1 GENERAL CONSIDERATIONS

Mitigation, in the environment, consists of human intervention with the aim of reducing or remedying a specific harmful environmental and social impact. It also means reference to a specific act.

According to the *National Environmental Policy Act*, mitigation measures include:

- Preventive measures (aimed at avoiding an impact);
- Minimizing measures (which aim to reduce an impact);
- Compensatory measures (which aim to compensate for an unavoidable impact) (CEQ, 1987).

Mitigation measures may consist of specific actions to be implemented during the preparation/construction and operation phases of the Project. This EIA suggests several generic mitigation measures to be implemented by the end of the preparation/construction phase and some specific mitigation measures for the negative impacts identified at the level of the different descriptors in both phases, thus aiming to reduce the impacts in a comprehensive manner and covering all descriptors.

The changes caused by the activities planned in the project can be minimized, prevented, compensated for, monitored, or improved through the adoption of measures and programs aimed at improving the environmental and social quality of the project and adapting its integration into the environment.

The first level of mitigation measures applies to the Implementation Project, which will be developed by the winner of the tender for the construction of the Silo Plant. This project will be prepared based on the Base Project analyzed in this EIAS report. The measures to be implemented in the Implementation Project focus on the technical specifications of the project elements and the construction methodologies to be adopted by the Contractor.

The second level of mitigation measures refers to preventive actions, whose main objective is to avoid the emergence of negative impacts and reduce the environmental risks of certain activities during the construction or operation phase of the project.

In addition to the hierarchical approach, the presentation of mitigation measures is also structured according to the project phases (execution, construction, and operation) and organized by thematic areas.

The proposed measures focus on impact prevention and mitigation. However, as the project is located in an area of critical habitats, it will be necessary, in accordance with AfDB Operational Safeguard 3, to adopt compensatory measures. This issue is detailed in the Biodiversity Action Plan, a document complementary to this EIA, which will describe the proposed compensatory measures, with an emphasis on the conservation of the region's fauna and flora.

The mitigation measures presented follow the guidelines of the African Development Bank's Integrated Safeguards System, particularly Operational Safeguards (OS) 1, 3, 4, and 5, as well as the regulations and standards established by international conventions.

Six complementary initiatives are presented, aimed at supporting local organizations, as well as training and awareness-raising actions for the community in the region.

These measures were directly related to the effects to be caused by the construction and operation of the Silo Plant, owned by the Carrinho Group, SA.

8.2 GENERAL AND SPECIFIC MEASURES

The proposed general and specific measures will be implemented during the construction and operation phases.

As presented in Tables 53, 54, 55, and 56.

Table 53: General mitigation and enhancement measures for environmental and social impacts (construction phase)

ID	ACTION/ACTIVITY	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MGC 1	Construction	Develop and implement a construction site management program	Contractor	(included in the construction site installation cost)
MGC 2	Construction	Develop and implement a complaint resolution mechanism.	Contractor	USD 2,000/month
MGC 3	Construction	Monitoring Plan for Stored Effluents	Contractor	3,500 USD
MGC 4	Construction	Development and implementation of the Worker Health and Safety Plan	Contractor	8,000 USD
MGC 5	Construction	Preparation and implementation of an Emergency Plan	Contractor	8,000 USD
MGC 6	Construction	Preparation and implementation of the Environmental and Social Management Plan	Contractor	5,500 USD/month
MGC 7	Construction	Develop and implement Environmental Education Program	Contractor	1,000 USD/month
MGC 8	Construction	Develop and implement a Communication and Stakeholder Relations Plan	Contractor	3,000 USD/month
MGC 9	Construction	Preparation and implementation of an environmental and social monitoring plan on the progress of the works, including the impacts caused and the measures taken to mitigate and/or compensate for them, which must be submitted to MINAMB.	Contractor	3,500 USD/per report
MGC 10	Construction	Preparation and implementation of a Waste Management Plan	Contractor	4,500 USD
MGC 11	Installation of fencing	In order to reduce noise, dust, and exhaust emissions to the outside, the construction site will be fenced around its entire perimeter with opaque hoardings at least 2 m high.	Contractor	(included in the installation cost of the yard)
MGC 12	Safety signage	The Silos Plant construction site and access roads must be properly signposted and marked to avoid and prevent any type of incident and/or accident involving workers and/or the general public.	Contractor	(included in the cost of setting up the construction site)
MGC 13	Construction	Install adequate sanitary facilities for workers	Contractor	(included in the cost of setting up the site)
MGC 14	PPE	Provide personal and collective protective equipment appropriate to the type of activities to be carried out	Contractor	(included in the cost of setting up the site)
MGC 15	Appointment of a person responsible for implementing mitigation measures	The contractor shall appoint a qualified environmental technician who shall be solely responsible for coordinating the implementation of environmental impact mitigation measures and monitoring programs. This professional shall act as an intermediary between the person responsible for executing the work and the teams in charge of implementing the established monitoring programs.	Contractor	(included in the cost of the contract)

ID	ACTION/ACTIVITY	MITIGATION MEASURES	RESPONSIBILITIES	COSTS (USD)
MGC 16	Supply of aggregates to the construction site	The supply of material from the quarry to the construction site should be carried out, whenever feasible, directly from the quarry to the work areas, in order to minimize the occupation of space with construction materials in the construction area, in addition to reducing the frequency of loading and unloading operations of aggregates.	Contractor	(included in the cost of setting up the site)
MGC 17	Origin of aggregates	All aggregates used on site must be of legal origin, i.e., they must be purchased from quarries authorized by the competent authority and duly licensed by the Ministry of the Environment.	Contractor	(included in the cost of the contract)
MGC 14	Transport of aggregates	Ensure the proper storage of construction materials and waste from the work, especially those of a powdery or particulate nature, in order to prevent their dispersion and fall on public roads during transport to the work area or final disposal site.	Contractor	(included in the cost of the contract)

Table 54: Specific mitigation and enhancement measures for environmental and social impacts (construction phase)

ID	DESCRIPTION	ENVIRONMENTAL IMPACT	MITIGATION MEASURES	RESPONSIBILITIES	COSTS (USD)
MMC 1	**Climate**	Change in evapotranspiration and ground-level temperature	Limit excavation and waterproofing to areas where strictly necessary.	Contractor	(Included in the work to be carried out by the Contractor)
MMC 2	**Geology and geomorphology**	Change in local geomorphology	Limit excavations to areas where strictly necessary.	Contractor	(Included in the work to be carried out by the Contractor)
MMC 3	**Soils**	Reduction in water infiltration capacity	The movement of machinery and other equipment involved in the work must be strictly confined to the designated areas;	Contractor	(Included in the work to be performed by the Contractor)
MMC 4	**Soils**	Soil erosion	Avoid prolonged exposure of soils	Contractor	(Included in the work to be performed by the Contractor)
MMC 5	**Soils**	Contamination by spillage	Keep equipment and machinery in good working order; maintenance must be carried out in a safe and waterproof location;	Contractor	(included in the cost of installation of the construction site)
MMC 6	**Surface water resources**	Contamination of waterways by accidental spills and/or runoff of waste and solid sediments	Keep machinery and vehicles in good working order, do not perform maintenance in unsealed areas that are unsafe;	Contractor	(included in the cost of setting up the construction site)
MMC 7	**Surface water resources**	Contamination of waterways by accidental spills and/or runoff of waste and solid sediments	Properly store waste resulting from construction work;	Contractor	(included in the cost of setting up the construction site)

ID	DESCRIPTION	IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MMC 8	**Surface water resources**	Contamination of waterways by accidental spills and/or runoff of waste and solid sediments	Identify probable temporary watercourses or streams that may influence the dynamics of surface water flow;	Contractor	(included in the installation cost of the site)
MMC 9	**Groundwater resources**	Contamination of the aquifer by accidental spills and/or runoff of waste	Keep machinery and vehicles in good working order, do not perform maintenance in inappropriate locations;	Contractor	(included in the cost of setting up the construction site)
MMC 10	**Groundwater resources**	Contamination of the aquifer by accidental spills and/or runoff of waste	Restriction to the strictly necessary number of temporary accesses and movement of vehicles assigned to the work;	Contractor	(Included in the work to be carried out by the Contractor)
MMC 11	**Groundwater resources**	Contamination of the aquifer by accidental spills and/or runoff of waste	Restrict the waterproofing of areas, thereby facilitating greater infiltration of rainwater into the soil and reducing runoff	Contractor	(Included in the work to be carried out by the Contractor)
MMC 12	**Flora**	Disturbance and destruction of native flora	Avoid degradation of existing vegetation cover by restricting vehicle traffic areas;	Contractor	(Included in the work to be carried out by the Contractor)
MMC 13	**Flora**	Disturbance and destruction of native flora	Do not set fire to surrounding vegetation and implement fencing around natural areas where endemic and endangered species occur.	Contractor	(Included in the work to be carried out by the Contractor)
MMC 14	**Flora**	Disturbance and destruction of native flora	Raise awareness among workers and communities about the importance of the areas created and the species that inhabit them, especially endemic and endangered species.	Contractor and NGOs	(included in the cost of the contract)
MMC 15	**Fauna**	Disturbance of local fauna	Raise awareness among workers and communities about the importance of preserving endemic or endangered species;	Contractor and NGOs	(included in the cost of the contract)
MMC 16	**Fauna**	Risks of species being run over and killed	Reduce the speed of machinery and vehicles to prevent species being run over and killed. Monitoring and relocation of wild species, especially endangered or endemic species.	Contractor	(Included in the work to be performed by the Contractor)

ID	DESCRIPTION	IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MMC 17	**Landscape**	Landscape alteration	Support infrastructure, materials, and equipment should be established in appropriately selected areas to avoid dispersion. selected areas in order to avoid dispersion;	Contractor	(included in the cost of the contract)
MMC 18	**Landscape**	Landscape alteration	Respect for the construction typology of the work;	Contractor	(included in the cost of the contract)
MMC 19	**Air quality**	Air quality degradation (particulate and gas emissions)	Avoid driving vehicles and machinery at high speeds, obeying the speed limits (60 km/h and 30 km/h) near and within towns;	Contractor	(Included in the work to be carried out by the Contractor)
MMC 20	**Air quality**	Degradation of air quality (particulate and gas emissions)	Moisten areas where dust may be generated;	Contractor	(included in the cost of the contract)
MMC 21	**Air quality**	Degradation of air quality (particulate and gas emissions)	Keep machinery and vehicles in good working order and use them strictly when necessary;	Contractor	(included in the cost of the contract)
MMC 22	**Air quality**	Degradation of air quality (particulate and gas emissions)	Avoid burning waste and vegetation;	Contractor	(Included in the work to be performed by the Contractor)
MMC 23	**Air quality**	Degradation of air quality (particulate and gas emissions)	In order to reduce the emission of dust and exhaust gases to the outside, the construction site will be fenced around its entire perimeter with opaque hoardings at least 2 m high.	Contractor	(included in the cost of setting up the construction site)

ID	DESCRIPTION	IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MMC 24	**Noise environment**	Increased noise levels	Prevent vehicles from traveling at high speeds, obeying the established limits (60 km/h and 30 km/h) near and within localities;	Contractor	(Included in the work to be performed by the Contractor)
MMC 25	**Noise environment**	Increased noise levels	In order to reduce noise emissions to the outside, the construction site will be fenced off around its entire perimeter with opaque hoardings at least 2 m high.	Contractor	(included in the cost of setting up the site)
MMC 26	**Noise environment**	Increased noise levels	Perform regular maintenance on equipment and machinery, and use them only when strictly necessary.	Contractor	(included in the cost of the contract)
MMC 27	**Socioeconomics**	Job creation	The creation of new unskilled jobs should primarily benefit the populations in the immediate vicinity of the infrastructure; All labor employed by Central de Silos will comply with the provisions of international conventions on the protection of children's and workers' rights to which Angola is a signatory through the International Labor Organization (ILO), as well as the provisions of the Integrated Safeguards System of the AfDB, namely Operational Safeguard 5.	Contractor	(included in the cost of the contract)
MMC 28	**Socioeconomics**	Revitalization of economy and and associated sectors	Materials to support this phase should preferably be purchased on the local market;	Contractor	(included in the cost of the contract)
MMC 29	**Socioeconomics**	Increased inconvenience for the local population	Vehicles must comply with the speed limits (60 km/h and 30 km/h) near and within towns, avoiding the use of audible signals that disturb residential areas;	Contractor	(Included in the work to be carried out by the Contractor)

ID	DESCRIPTION	IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MMC 30	**Socioeconomics**	Accident risks	Vehicles must comply with the speed limits (60 km/h and 30 km/h) near and within towns;	Contractor	(Included in the work to be carried out by the Contractor)

MMC 31	**Socioeconomics**	Accident risks	Training and awareness campaigns on defensive driving	Contractor	USD 2,000/month
MMC 32	**Infrastructure**	Pressure on the road network and urban infrastructure (water, energy, and sanitation)	Comply with the established speed limits (60 km/h and 30 km/h) near and within towns, and reduce speed on unpaved roads;	Contractor	(Included in the work to be carried out by the Contractor)
MMC 33	**Infrastructure**	Pressure on the road network and urban infrastructure (water, energy, and sanitation)	Training and awareness campaigns on defensive driving	Contractor	(included in the cost of the contract)
MMC 34	**Infrastructure**	Pressure on the road network and urban infrastructure (water, energy, and sanitation)	Water abstraction must be preceded by authorization from the competent authority, and specific measures must be adopted for its management;		(included in the cost of the contract)
MMC 35	**Infrastructure**	Pressure on the road network and urban infrastructure (water, energy, and sanitation)	Wastewater must be properly stored in appropriate containers in a safe area, and its collection, treatment, and disposal must be carried out by a company duly licensed for this purpose	Contractor	(included in the cost of the contract)
MMC 36	**Waste**	Risks of environmental contamination	Non-hazardous waste must be disposed of by a company duly licensed for this purpose; All polluting substances used must be stored in appropriate locations with restricted access and properly waterproofed to reduce the risk of accidental spills. In the event of an accidental spill of any polluting substance, measures to contain the contamination must be taken immediately, including immediate cleaning of the site, stripping and removal of the affected soil layer, where applicable, and transport of the resulting waste to an appropriate final destination .	Contractor	(included in the cost of the contract)

ID	DESCRIPTION	IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MMC 37	**Waste**	Risks of environmental contamination	All hazardous waste resulting from machine maintenance and other activities must be stored in a suitable location and sent to a licensed company for final disposal;	Contractor	(included in the cost of the contract)
MMC 38	**Waste**	Risks of environmental contamination	Prohibit the burning of any type of waste in the open air and/or its burial.	Contractor	(Included in the work to be performed by the Contractor)
MMC 39	**Waste**	Waste production	The contractor shall adopt a Waste Management Plan based on the following guidelines. To ensure efficient management of waste generated on site and its temporary storage, a specific area for selective waste disposal will be created on the construction site, which will be covered and equipped with big bags and metal or plastic containers properly identified according to the type of waste to be disposed of. Metal containers/drums should be available for at least the following types of waste: wood, iron and steel, concrete, plastics/PVC, paper/cardboard, and packaging, among others. Hazardous waste, such as that containing hydrocarbons, solvents, batteries, and contaminated fabrics, should be stored in specific containers, properly identified and protected by a cover. This approach will promote the separation of all waste at source, preventing mixing and contamination, as well as facilitating its recovery when transferred to waste management operators duly licensed by the competent authorities. This measure follows the guidelines established in Presidential Decree No. 190/12, of August 24, which defines the general regime applicable to waste prevention, generation, and management, in addition to regulating the licensing and concession of waste management activities. The disposal of construction waste must comply with the provisions of Executive Decree No. 17/13 (Management of Construction and Demolition Waste). This action complies with the requirements of Operational Safeguard 4, which the contractor is required to comply with.	Contractor	(included in the contract cost)

Table 55: General mitigation and enhancement measures for environmental and social impacts (operation phase)

ID	ACTION/ACTIVITY	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)

MGO 1	**Preparation of a Manual of Good Environmental Practices**	To ensure that the activities of the Silo Plant do not pose unnecessary pollution risks, the facilities must have a Manual of Good Environmental Practices, which establishes the environmental management procedures to be followed by both employees and service providers when accessing the facilities. This manual must ensure that the waste generated is properly disposed of, stored, and transported to authorized and regulated locations, in accordance with the provisions of Presidential Decree No. 190/12 of August 24, which defines the general regime applicable to waste prevention, generation, and management, in addition to regulating the licensing and concession of waste management activities.	Proponent	USD 3,500
MGO 2	**Preparation of an Emergency Plan**	The Silos Center must have a pollution control system in place that is compatible with the scale of the activities carried out there, allowing for the rapid and safe removal of potentially polluting substances, such as hydrocarbons and others, that may be accidentally spilled and could affect the soil or air. This measure complies with the provisions of the AfDB's Integrated Safeguard System, namely Operational Safeguard 4.	Proponent	USD 16,000/year
MGO 3	**Preparation of a Waste Management Plan**	Carrinho, Sa, will adopt a Waste Management Plan based on the following guidelines. To ensure the selective collection of waste generated during the operation of the Silos Center, appropriate containers will be installed for the temporary storage of the different types of waste expected, including those produced by users of the Silos Center (solid urban waste), those resulting from the loading and unloading of goods, as well as a specific area for the disposal of hazardous waste. All containers will be properly identified with an indication of the type of waste that can be disposed of in each one. The storage, transport, and final disposal of waste will be carried out in accordance with Presidential Decree No. 190/12 of August 24, which defines the general regime applicable to waste prevention, generation, and management, as well as the rules for licensing and concession of waste management activities. This measure complies with Operational Safeguard 4, which the contractor is obliged to comply with.	Proponent	(included in facility operating costs)
MGO 4	**Conducting Drills**	The Silo Center must have a plan for conducting accident drills involving spills of hydrocarbons and other pollutants. This plan should enable the assessment and supervision of the technical resources available at the Silo Center, ensuring that they are in good operating condition. Evidence of the implementation and compliance with the plan must be accessible to the authorities during inspection and enforcement actions.	Proponent	(included in facility operating costs)
MGO 5	**Workplace Accidents**	Development and implementation of the Worker Health and Safety Plan	Proponent	(included in facility operating costs)

ID	ACTION/ACTIVITY	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MGO 6	**Infrastructure operation**	Implementation of the Environmental and Social Management Plan	Proponent	(included in facility operating costs)

MGO 7	**Legal compliance**	Preparation of monitoring reports to be submitted to MINAMB	Proponent	(included in facility operating costs)
MGO 8	**Conflicts with the community**	Implementation of a Complaint Resolution Mechanism.	Proponent	(included in facility operating costs)
MGO 9	**Legal compliance and continuous improvement**	Implementation of external audits	Proponent/Minamb/Local administration	USD 22,000/year
MGO 10	**Pest proliferation**	Pest control and eradication plan	Proponent	12,000 USD/year

Table 56: Specific mitigation and enhancement measures for environmental and social impacts (operation phase)

ID	DESCRIPTION	IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MMO 1	**Climate**	Increased perception of heat discomfort	Promote the restoration of the areas affected by planting gardens and trees that are suited to the area;	Proponent	(included in facility operating costs)

MMO 2	**Geology and geomorphology**	Change in local geomorphology	Take into account the micro-basin of the region in order to effectively direct rainwater;	Contractor/proponent/supervision	(included in facility operating costs)
MMO 3	**Geology and geomorphology**	Change in local geomorphology	Circulation of machinery and vehicles only in designated areas;	Proponent	(included in facility operating costs)
MMO 4	**Geology and geomorphology**	Change in local geomorphology	Avoid exposing areas that will not be used in the short term;	Contractor/Bidder	(included in facility operating costs)
MMO 5	**Soils**	Soil contamination due to accidental spills	Keep equipment and machinery in good working order; maintenance must be carried out in a safe, waterproof location.	Proponent	(included in facility operating costs)
MMO 6	**Soil**	Soil contamination due to accidental spills	Develop an internal spill management and response plan.	Proponent	(included in facility operating costs)
MMO 7	**Surface water resources**	Contamination of watercourses by accidental spills and/or runoff of waste and solid sediments	Maintenance of generators and other equipment must be carried out in a specific, waterproofed area with the necessary safety conditions (spill emergency kit);	Proponent	(included in facility operating costs)
MMO 8	**Surface water resources**	Contamination of waterways by accidental spills and/or runoff of solid waste and sediments	When installing an urban and industrial wastewater treatment system, it must comply with current legislation regarding discharge standards;	Proponent	(included in facility operating costs)

ID	DESCRIPTION	IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MMO 9	**Surface water resources**	Impact on surface water drainage patterns and increased runoff	Installation of appropriately sized storm drainage networks.	Contractor/Supervision/Proponent	(included in facility operating costs)
MMO 10	**Groundwater resources**	Contamination of the aquifer by accidental spills and/or runoff of waste	Maintenance of generators and other equipment must be carried out in a specific, waterproofed area with the necessary safety conditions (spill emergency kit);	Proponent	(included in the operating costs of the facilities)
MMO 11	**Groundwater resources**	Contamination of the aquifer by accidental spills and/or runoff of waste	Store waste and other in suitable containers and store them on spill containment basins;	Proponent	(included in the operating costs of the facilities)
MMO 12	**Flora**	Disturbance and destruction of native flora	Prevent degradation of existing vegetation cover by restricting vehicle traffic areas;	Proponent	(included in the facility operating costs)
MMO 13	**Flora**	Disturbance and destruction of native flora	Prohibit the burning of any type of waste, as well as surrounding vegetation, and implement fencing around natural areas where endemic and endangered species occur.	Proponent	(included in facility operating costs)
MMO 14	**Flora**	Disturbance and destruction of native flora	Raise awareness among workers and communities about the importance of preserving endemic and endangered species.	Proponent/NGOs/Administration	USD 10,000/year
MMO 15	**Flora**	Disturbance and destruction of native flora	Vehicles and machinery must be driven at moderate speeds, especially on unpaved areas;	Proponent	(included in the facility operating costs)
MMO 16	**Flora**	Disturbance and destruction of native flora	Support local associations focused on research and preservation of flora.	Proponent	(included in facility operating costs)
MMO 17	**Fauna**	Disturbance of local fauna	Raise awareness among workers and communities about the importance of preserving endemic or endangered species;	Proponent/NGOs/Administrati on	(included in the operating costs of the facilities)

ID	DESCRIPTION	IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MMO 18	**Fauna**	Disturbance of local fauna	Avoid noisy activities at night;	Proponent	(Included in work to be carried out by the operator)

MMO 19	**Fauna**	Disturbance of local fauna	Direct lighting from the facilities downwards, thus avoiding disturbance and/or accidental death of birds against fixed objects;	Contractor/Proponent	(included in the operating costs of the facilities)
MMO 20	**Fauna**	Risks of species being run over and killed	Reduce the speed of machinery and vehicles in order to prevent the running over and death of species. Monitoring and relocation of wild species, especially endangered or endemic species.	Proponent/Service providers	(Included in the work to be carried out by the operator)
MMO 21	**Fauna**	Species preservation	Raising awareness among workers not to kill animals that invade the premises; to this end, they should always be captured and returned to their natural habitat	Proponent	(Included in the work to be carried out by the operator)
MMO 22	**Fauna**	Species preservation	Support local associations focused on wildlife research and preservation.	Proponent	10,000 USD
MMO 23	**Landscape**	Landscape alteration	Maintain facilities in good condition;	Proponent	(included in facility operating costs)
MMO 24	**Landscape**	Landscape alteration	Create a specific area for parking machinery and vehicles;	Contractor/Proponent	(included in facility operating costs)
MMO 25	**Landscape**	Landscape alteration	Night lighting should be directed downward;	Contractor/Proponent	(included in the facility operating costs)
MMO 26	**Landscape**	Landscape alteration	Do not use colors that contrast significantly with the surroundings.	(included in facility operating costs)	(included in facility operating costs)

ID	DESCRIPTION	IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MMO 27	**Air quality**	Degradation of air quality (particulate and gas emissions)	Avoid driving vehicles and machinery at high speeds, obeying the speed limits (60 km/h and 30 km/h) near and within towns;	Grain operators/transporters	(Included in the work to be performed by the operator)
MMO 28	**Air quality**	Degradation of air quality (particulate and gas emissions)	Moisten areas where dust may be generated;	Operator	(included in the facility operating costs)
MMO 29	**Air quality**	Degradation of air quality (particulate and gas emissions)	Keep machinery and vehicles in good technical condition and use them strictly when necessary;	Operator	(included in the facility operating costs)
MMO 30	**Air quality**	Degradation of air quality (particulate and gas emissions)	Avoid burning any type of waste and surrounding vegetation;	Operator	(Included in the work to be carried out by the operator)
MMO 31	**Air quality**	Degradation of air quality (odor emissions)	All waste must be properly stored in suitable containers to mitigate odor emissions;	Operator	(included in the operating costs of the facilities)
MMO 32	**Air quality**	Air quality degradation (particulate and gas emissions)	When disinfecting facilities, avoid spraying insecticides during very dry and windy periods.	Operator	(Included in the work to be performed by the operator)
MMO 33	**Noise environment**	Increased noise levels	Avoid high-speed vehicle traffic, complying with the established limits (60 km/h and 30 km/h) near and within localities;	Operator/Grain transporters	(Included in the work to be performed by the operator)
MMO 34	**Noise environment**	Increased noise levels	Implement a noise monitoring program.	Operator	(included in the operating costs of the facilities)
MMO 35	**Noise environment**	Increased noise levels	Perform regular maintenance on equipment and machinery, and use them only when strictly necessary.	Operator	(included in the facility operating costs)

ID	DESCRIPTION	IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MMO 36	**Noise environment**	Increased noise levels	Whenever possible, noisy equipment should be enclosed or installed in closed areas to mitigate the noise levels generated.	Operator	(included in the operating costs of the facilities)
MMO 37	**Socioeconomics**	Revitalization of economy and and associated sectors	Materials to support the facilities at this stage should preferably be purchased on the local market;	Operator	(included in the operating costs of the facilities)
MMO 38	**Socioeconomics**	Revitalization of economy and and associated sectors	Set fair and competitive prices for grain purchases, which encourage increased production by individual farmers and existing cooperatives	Operator/Local administration	(included in the of facility operation)
MMO 39	**Socioeconomics**	Job creation	The creation of new unskilled jobs should primarily benefit the populations living in the immediate vicinity of the infrastructure; All labor employed by the Silos Plant will comply with the provisions of international conventions on the protection of the rights of children and workers to which Angola is a signatory through the International Labor Organization (ILO), as well as the provisions of the AfDB's Integrated Safeguards System, namely Operational Safeguard 5.	Operator	(included in the operating costs of the facilities)
MMO 40	**Socioeconomics**	Revitalization of economy and and associated sectors	Provide technical support and knowledge of good agricultural practices to the most disadvantaged populations, in order to obtain higher yields and strengthen crops, thereby contributing thus to the fight against poverty.	Operator/NGOs/Local administration	USD 20,000/month
MMO 41	**Socioeconomics**	Increased inconvenience for the local population	Vehicles must comply with the speed limits (60 km/h and 30 km/h) near and within towns, avoiding the use of audible signals that disturb residential areas;	Grain operators/transporters	(Included in the work to be carried out by the operator)
MMO 42	**Socioeconomics**	Increased food availability	Food must be made available in accordance with quality standards to promote the health and well-being of consumers.	Grain operators/transporters	(included in facility operating costs)

ID	DESCRIPTION	IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MMO 43	**Socioeconomics**	Accident risks	Vehicles must comply with the speed limits (60 km/h and 30 km/h) near and within towns;	Grain operators/transporters	(Included in the work to be performed by the operator)
MMO 44	**Socioeconomics**	Accident risks	Training and capacity building in occupational health and safety, and availability of PPE and CPE.	Operator	(included in the costs of facility operation)
MMO 45	**Socioeconomics**	Accident risks	Training and awareness campaigns on defensive driving	Grain operator/transporters	(included in the costs of facility operation)
MMO 46	**Socioeconomics**	Appreciation of agricultural land in the region	Local authorities should guard against land price speculation;	Operator/Local administration	(Included in the work to be carried out by the operator)
MMO 47	**Infrastructure**	Pressure on the road network	Comply with the established speed limits (60 km/h and 30 km/h) near and within towns, and reduce speed on unpaved roads;	Grain operators/transporters	(Included in the work to be carried out by the operator)
MMO 48	**Infrastructure**	Pressure on the road network	Training and awareness campaigns on defensive driving	Operator/Grain transporters	(included in the operating costs of the facilities)
MMO 49	**Infrastructure**	Pressure on the road network	Transport goods at pre-established times, avoiding congested routes whenever possible;	Grain operators/transporters	(Included in the tasks to be performed by the operator)
MMO 50	**Infrastructure**	Pressure on urban infrastructure (water, energy, and sanitation)	Water abstraction must be preceded by authorization from the competent local authority, and specific measures must be adopted for its management;	Proponent	(included in the operating costs of the facilities)
MMO 51	**Infrastructure**	Pressure on urban infrastructure (water, energy, and sanitation)	Wastewater must be properly stored in appropriate containers in a safe area. and its collection, treatment, and disposal must be carried out by a company duly licensed for this purpose.	Proponent	(included in the costs of facility operation costs)

ID	DESCRIPTION	IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (USD)
MMO 52	**Infrastructure**	Pressure on urban infrastructure (water, energy, and sanitation)	Monitor water and energy consumption and waste production, drawing up a plan to reduce them;	Proponent	(included in operating costs) facilities)

MMO 53	**Waste**	Risks of environmental contamination	Develop and implement a waste management plan	Proponent	(included in the operating costs of the facilities)
MMO 54	**Waste**	Risks of environmental contamination	All hazardous waste derived from machine maintenance must be stored in a suitable location and sent to a licensed company for final disposal	Proponent	(included in the costs of facility operation)
MMO 55	**Waste**	Risks of environmental contamination	Install equipment (recycling bins) that facilitates the segregation and reuse of waste in accordance with the waste management plan (WMP), and encourage practices aimed at reducing waste production waste production;	Proponent	(included in the operating costs of the facilities)
MMO 56	**Waste**	Risks of environmental contamination	Prohibit the burning of any type of waste in the open air and/or its disposal in landfills.	Proponent	(Included in the work to be carried out by the operator)

9 CUMULATIVE IMPACTS

The cumulative effects of the project refer to the combined impact of the activities of the Balombo Silo Plant over time, added to the impacts of other projects and activities in the region. These effects can be synergistic, when they interact and amplify each other, or additive, when they simply add to existing impacts.

This section summarizes the significant residual impacts that were identified for the construction and operation phases of the infrastructure in Chapter 7. Thus, residual impacts are those that remain significant after the application of the mitigation and enhancement measures proposed in Chapter 8.

Given the nature of the Silo Plant, the main cumulative effects include changes in air quality due to atmospheric emissions and particle dispersion, impacts on water resources resulting from consumption and effluent disposal, and possible consequences for local biodiversity. In addition, the intensification of heavy vehicle traffic and increased economic activity may generate additional challenges related to noise, road safety, and urban infrastructure.

The assessment of cumulative effects is essential to ensure that the implementation and operation of the project occur in a sustainable manner, preventing irreversible impacts and promoting effective mitigation measures. To this end, an integrated approach to environmental monitoring, emissions control, waste management, and dialogue with local communities will be adopted, ensuring a balance between economic development and environmental conservation.

10 PROGRAM FOR MONITORING AND TRACKING ENVIRONMENTAL AND SOCIAL IMPACTS

Monitoring consists of establishing discrete or continuous measurements of the numerical attributes of each impact. Follow-up consists of observing environmental quality after a given action. The frequency of actions varies for each impact and for each phase of the project. The objectives of these actions are to verify the efficiency of each mitigation measure established for each impact, and to maintain and/or restore environmental balance.

This EIA encourages the business group to adopt and develop measures aimed at achieving better environmental and social performance in the execution of its activities, in order to achieve excellence in relation to its environmental policy, following the exemplary model that has been implemented in the other units of this business group.

Thus, the following monitoring and follow-up programs were proposed:

1) Program for monitoring effluents stored in septic tanks

2) Worker health and safety program

3) Atmospheric emission and air quality monitoring program

4) Noise level monitoring program

5) Environmental education program

6) Waste monitoring and management program.

7) Biodiversity monitoring program

8) Emergency plan

9) Pest control and management plan

10) Communication and stakeholder relations program.

11) EIA monitoring report submission mechanism

12) Environmental and social performance audits

Table 57: Summary of cumulative impacts

Project phase	Type of cumulative impact	Description	Accumulation factors	Mitigation measures
Construction	Increase of traffic and road congestion	Construction work causes an increase in truck and heavy machinery traffic in already congested areas	Proximity to urban roads, other projects under construction.	Define specific transport routes; adequate signage; coordination of schedules to avoid peak hours.
	Noise generation	Machinery and demolition increase noise in an already noisy environment.	Urban traffic, other civil works.	Limit noisy activities to daytime hours; use machines with silencers; install temporary acoustic barriers. .
	Air pollution (dust and emissions)	Dust and gas emissions from excavations and vehicles.	Urban traffic, nearby industrial activities	Daily watering of roads and exposed areas; covering trucks; restrict movement on windy days.
	Pressure on urban infrastructure	Additional consumption of water, energy, and road use.	Interconnection with the existing urban network	Use of efficient systems; water reuse; renewable energies whenever possible.
	Construction waste	Accumulation of solid waste, rubble, and packaging.	Other construction sites and nearby developments.	Segregation and proper packaging; shipment to final destination ; maximizing material reuse.
Operation	Continuous heavy traffic	Frequent entry and exit of trucks for loading/unloading grain.	Proximity to other warehouses/logistics facilities.	Traffic management plan; road maintenance; scheduled loading/unloading times outside peak hours.
	Visual impact and urban land use	Large structures alter the landscape and land use in urbanized areas.	Verticalization and construction density.	Landscaping and tree planting; painting Regular maintenance and upkeep of structures.
	Risks of infestation (pests, rodents)	Poor grain management can attract vectors, affecting nearby residential areas.	Proximity to housing, lack of integrated pest control	Implement an integrated pest control program; regular inspections; sealing of cracks.
	Generation of continuous operational noise	Engines, fans, forklifts operating in shifts.	Residential residential in the vicinity	Install soundproofing; limit nighttime operation nighttime operation; periodic maintenance to reduce vibration.
	Odor (in case of grain deterioration)	Poor storage can cause noticeable odors in urban areas	Accumulation of organic waste and lack of adequate ventilation	Selective collection system; licensed disposal destination final destination licensed; composting of organic waste.

11 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

11.1.1 General considerations

The Environmental and Social Management Plan (ESMP) for the Balombo Silo Plant establishes guidelines, preventive measures, and corrective actions to ensure that the construction and operation of the project are conducted in an environmentally sustainable and socially responsible manner.

The main objective of this plan is to mitigate the potential environmental and social impacts resulting from the installation and operation of the Silos Plant, ensuring compliance with current legislation and international best practices in environmental management. In addition, it seeks to promote worker safety, the quality of life of local communities, and the conservation of the region's natural resources.

The implementation of the PGAS involves a set of programs and measures aimed at monitoring environmental quality, controlling atmospheric emissions, proper waste management, protecting biodiversity, occupational safety and health, and strengthening dialogue with stakeholders. The integrated approach of this plan will minimize environmental and social risks, contributing to the sustainability of the project and the socioeconomic development of the region.

This chapter details the main components of the PGAS, including institutional responsibilities, monitoring and reporting mechanisms, and environmental mitigation and compensation strategies. Strict adherence to these guidelines will ensure that the Balombo Silo Plant operates in accordance with the principles of sustainability, promoting a balance between economic growth, environmental preservation, and social well-being.

11.2 MONITORING PROGRAM FOR EFFLUENTS STORED IN SEPTIC TANKS

11.2.1 Objective

- Ensure that effluents stored in septic tanks comply with environmental standards;
- To reduce environmental impacts and protect water resources and public health;
- To evaluate the efficiency of the facility's sanitary sewage treatment system;
- Identify possible contamination and propose corrective measures.

11.2.2 Justification

- Improper storage of effluents can result in soil infiltration and groundwater contamination.
- Inadequate decomposition of organic matter can generate odors and proliferation of disease vectors;
- Compliance with environmental and health regulations avoids penalties and protects the local community.

11.2.3 Parameters to be analyzed and monitoring frequency

The following parameters should be analyzed regularly:

Table 58: Parameters to be analyzed and frequency of monitoring

Parameter	Unit	Frequency	
		Construction phase	Operation phase
PH	-	Monthly	Quarterly
BOD (Biochemical Oxygen Demand)	mg/L	Monthly	Quarterly
COD (Chemical Oxygen Demand)	mg/L	Monthly	Quarterly
Total Suspended Solids (TSS)	mg/L	Bimonthly	Quarterly
Nitrates and Nitrites	mg/L	Bimonthly	Semiannual
Thermotolerant Coliforms	NMP/100mL	Monthly	Quarterly
Oils and Greases	mg/L	Quarterly	Semiannual

11.2.4 Monitoring methods

- Sample collection: Use of sterilized bottles in accordance with environmental standards;
- Laboratory analysis: Samples must be analyzed by a certified laboratory, applying standardized methodologies, such as:
  -Potentiometric method for pH;
  -Winkler method for BOD;
  -Spectrophotometry for COD and nitrates/nitrites;
  -Filtration and incubation technique for coliforms.
- On-site measurements: Checking effluent levels and observing odors and signs of leakage. Installing high-level alarms can also alert you when the tank is about to reach its maximum capacity.
- Periodic cleaning of the septic tank, usually every 1-3 years, is essential to remove accumulated sludge.

11.2.5 Responsibilities

Contractor: Responsible for monitoring during the construction phase. **Carrinho, SA**:

Responsible for implementing the program during the operational phase. **Local environmental**

agency: Conduct periodic inspections and audits.

Accredited laboratory: Analysis of samples and issuance of technical reports.

11.3 WORKER SAFETY AND HEALTH PLAN

11.3.1 Objective

- Ensure the physical and mental integrity of workers during the construction and operation phases of the silos;
- Prevent workplace accidents and minimize occupational risks;
- Ensure compliance with current occupational health and safety standards;
- Promote a safe and healthy work environment.

11.3.2 Justification

The construction and operation of silos involve risks such as falls, exposure to dust, high noise levels, inhalation of toxic gases, and handling of heavy machinery.

- The adoption of preventive measures reduces accidents and absences due to occupational illnesses;
- Compliance with labor and environmental legislation to avoid penalties and ensure the well-being of workers.

11.3.3 Parameter to be analyzed and frequency of monitoring

Table 59: Parameters to be analyzed and monitoring frequency

Parameters	Unit/indicator	Frequency	
		Construction phase	Operation phase
Work accidents	Number of occurrences	Monthly	Quarterly
Absenteeism rate	%	Monthly	Semiannual
Ergonomic conditions	Qualitative assessment	Quarterly	Semiannual
Noise level	dB(A)	Monthly	Quarterly
Air quality (dust, gases)	mg/m³	Monthly	Half-yearly
Use of personal protective equipment (PPE)	% compliance	Monthly	Monthly
Safety training	Number of training sessions held	Bimonthly	Semester

11.3.4 Monitoring method

- Periodic inspections at workplaces to identify risks;
- Laboratory analyses of air and noise to assess environmental quality;
- Reports on accidents and occupational diseases for control and continuous improvement;
- Training and awareness-raising for workers on safe practices;
- Use of PPE such as masks, gloves, ear protectors, and safety belts;
- Implementation of safety signage in hazardous areas;
- Regular occupational medical examinations to monitor workers' health.

11.3.5 Responsibilities

Contractor: Responsible for worker safety during the construction phase.

Cart, SA: Responsible for implementing the plan during the operational phase.

Occupational Safety Technician: Monitoring, training, and enforcement of safety standards.

Supervisors and managers: Ensuring compliance with preventive and corrective measures.

Workers: Follow safety guidelines, use PPE, and report risks.

Regulatory Authorities: Conduct inspections and audits in accordance with current legislation.

11.4 ATMOSPHERIC EMISSIONS AND AIR QUALITY MONITORING PROGRAM

11.4.1 Objective

- To assess and control atmospheric emissions from silo construction and operation activities.
- Ensure that air quality is within legal and recommended limits for public health and the environment;
- Identify sources of pollution and implement mitigation measures to minimize negative impacts;
- Prevent respiratory risks to workers and nearby communities.

11.4.2 Justification

During the construction phase, activities such as soil movement, material transport, and machinery use generate airborne particles (dust) and polluting gases (CO_2, NO_x, SO_2).

During the operational phase, grain handling, exhaust from transport engines, and silo ventilation processes can release particulate matter and gases that affect air quality.

Regular monitoring allows pollution patterns to be detected and operational practices to be adjusted to reduce impacts.

11.4.3 Parameter to be analyzed and monitoring frequency

Table 60: Parameters to be analyzed and monitoring frequency

Parameters	Unit/indicator	Frequency	
		Construction phase	Operation phase
Particulate matter (PM_{10}, $PM_{2.5}$)	µg/m³	Monthly	Quarterly
Sulfur dioxide (SO_2)	ppm	Monthly	Semiannual
Nitrogen oxides (NO_x)	ppm	Monthly	Semiannual
Carbon monoxide (CO)	ppm	Monthly	Semiannual
Carbon dioxide (CO_2)	ppm	Monthly Quarterly	Semiannual
Volatile organic compounds (VOCs)	ppm	Monthly Quarterly	Semiannual
Odors (grain decomposition)	Qualitative assessment	Whenever necessary	Quarterly

11.4.4 Monitoring method

- Direct measurements with portable equipment for CO, NO_2, SO_2, and VOCs;
- Sampling with air filters for laboratory analysis of particulate matter;
- Continuous monitoring at strategic points in and around the facility to assess pollutant dispersion;
- Use of fixed sensors for automatic real-time measurements (if applicable);
- Periodic reports for trend analysis and operational adjustments.

11.4.5 Responsibility

Contractor: Responsible for implementing control measures during the construction phase.

Cart, SA: Responsible for continuous monitoring and application of mitigation measures during the operational phase.

Environmental Technician: Sample collection, data analysis, and report preparation.

Environmental and Regulatory Agencies: Conducting audits and enforcing compliance with environmental standards.

11.5 NOISE LEVEL MONITORING PROGRAM

11.5.1 Objective

- To assess and control the noise levels generated by the construction and operation of the silos;
- Ensure that noise levels are within legal and recommended standards for public health and community well-being;
- Identify sources of excessive noise and adopt mitigation measures to reduce negative impacts;
- Prevent occupational risks for workers exposed to high noise levels.

11.5.2 Justification

During the construction phase, activities such as soil movement, use of heavy equipment, transportation of materials, and assembly of structures can generate high noise levels, affecting workers and nearby residents.

During the operational phase, the operation of fans, exhaust fans, engines, and truck traffic can result in noise levels above acceptable limits. The project intervention area, which is characterized as a residential area, is 55 dB(A) during the daytime (7:00 a.m. to 10:00 p.m.) and 45 dB(A) at night.

Continuous monitoring will allow trends to be assessed and corrective actions to be implemented to reduce noise impacts.

11.5.3 Parameter to be analyzed and monitoring frequency

Table 61: Parameters to be analyzed and monitoring frequency

Parameters	Unit/Indicator	Frequency	
		Construction phase	**Operating phase**
Sound pressure level (Leq)	dB(A)	Weekly	Quarterly
Maximum Noise Peak (Lmax)	dB(A)	Weekly	Quarterly
Background Noise (L90)	dB(A)	Monthly	Semiannual
Noise Perceived by Workers	Qualitative assessment	Whenever necessary	Whenever necessary

11.5.4 Monitoring method

- Measurements with sound level meters at strategic points inside and around the facility;
- Continuous monitoring in sensitive areas (nearby residential areas, administrative offices);
- Use of portable equipment for spot measurements at different times of the day (daytime and nighttime);
- Comparison with legal limits established by environmental and occupational safety standards;
- Periodic reports for trend analysis and operational adjustments.

11.5.5 Responsibility

Contractor: Responsible for monitoring and controlling noise during the construction phase.

Carrinho, SA: Responsible for monitoring and mitigating noise levels during the operational phase.

Environmental and Occupational Safety Technician: Collection of samples, data analysis, and preparation of reports.

Environmental and Regulatory Agencies: Conducting audits and enforcing compliance with noise standards.

11.6 ENVIRONMENTAL EDUCATION PROGRAM

11.6.1 Objective

- Raise awareness among workers and local communities about good environmental practices;
- Reduce environmental impacts associated with the construction and operation of silos;
- Promote the sustainable use of natural resources;
- Strengthen the culture of environmental safety and sustainability;
- Ensure compliance with environmental legislation and best practices.

11.6.2 Justification

During the construction phase, it is essential to train workers on waste management, emissions control, and environmental safety.

During the operational phase, environmental education will help maintain sustainable practices, prevent pollution, and involve the community in environmental actions.

11.6.3 Parameter to be analyzed and monitoring frequency

Table 62: Parameters to be analyzed and frequency of monitoring

Parameters	Indicator	Frequency	
		Construction phase	Operation phase
Number of training sessions conducted	Number of sessions/month	Monthly	Quarterly
Worker participation	% of participation	Monthly	Quarterly
Topics covered	Content checklist	Semester	Annual
Community awareness actions	Number of events	Quarterly	Semiannual
Adoption of good environmental practices	Qualitative assessment	Quarterly	Semi-annual

11.6.4 Monitoring method

- Training and lectures on waste, water use, pollution, and environmental conservation;
- Distribution of educational materials (booklets, videos, banners);
- Practical training on waste segregation, prevention of environmental accidents, and workplace safety;
- Community actions such as tree planting and cleaning of public areas;
- Periodic evaluation through forms and interviews.

11.6.5 Responsibility

Contractor: Implementation of the program during construction.

Carrinho, SA: Continuation of the program during the operational phase.

Environment and Safety Technician: Coordination of activities and evaluation of results.

Local Environmental Agencies: Monitoring of compliance with environmental standards.

11.7 COMMUNICATION AND STAKEHOLDER RELATIONSHIP PROGRAM

11.7.1 Objectives

- Establish effective channels of communication between Carrinho, SA and stakeholders;
- Ensure transparency in the construction and operation of silos;
- Prevent and mitigate conflicts with local communities and regulatory bodies;
- Promote community involvement in the environmental and social management of the project;
- Respond quickly and efficiently to stakeholder concerns.

11.7.2 Justification

During the construction phase, it is necessary to provide information on temporary impacts such as noise, vehicle traffic, and waste management.

During the operational phase, ongoing dialogue will help manage expectations, prevent conflicts, and keep the community informed about environmental measures and socioeconomic opportunities.

11.7.3 Parameter to be analyzed and monitoring frequency

Table 63: Parameter to be analyzed and frequency of monitoring

Parameters	Indicator	Frequency	
		Construction phase	**Operational phase**
Meetings with stakeholders	Number of meetings held	Quarterly	Semiannual
Active communication channels	Number of channels implemented (telephone, email, meetings)	Continuous	Continuous
Complaints received and resolved	Number of records and resolution rate (%)	Monthly	Quarterly
Community involvement actions	Number of events or social projects developed	Quarterly	Semiannual
Dissemination of project information	Number of press releases or newsletters published	Semiannually	Semiannual

11.7.4 Methods

- Creation of communication channels (telephone, email, public meetings, information panels);
- Regular meetings with local authorities, communities, and other stakeholders;
- Disclosure of reports and bulletins on impacts and mitigation measures;
- Recording and analysis of complaints with structured responses and proposed solutions;
- Service platform for community questions and suggestions.

11.7.5 Responsibility

Carrinho, SA: Implementation and supervision of the program.

Community Relations Manager: Mediation between the company and stakeholders.

Environmental and Municipal Agencies: Monitoring and oversight of communication actions.

Community and Workers: Active participation in communication channels.

11.8 WASTE MONITORING AND MANAGEMENT PROGRAM.

11.8.1 Objective

- Ensure that solid and liquid waste is managed in an environmentally sound manner and in accordance with applicable legislation;
- Minimize environmental and health impacts resulting from the generation, storage, transportation, and final disposal of waste;
- Promote recycling, reuse, and proper disposal of waste, reducing the amount sent to landfills;
- Prevent soil, water, and air contamination associated with poor waste management;
- Monitor the effectiveness of waste segregation and disposal practices throughout the project's life cycle.

11.8.2 Justification

During the construction phase, debris, construction waste, packaging, hazardous waste (paints, solvents, oils), and organic waste from the work team will be generated. Proper segregation and disposal are essential to avoid environmental and social impacts.

During the operational phase, the silos will produce organic waste (spoiled grain), packaging from inputs, hazardous waste (lubricants, oils), and municipal solid waste from employees. Monitoring the management of this waste will prevent contamination and ensure environmental compliance.

11.8.3 Parameter to be analyzed and monitoring frequency

Table 64: Parameter to be analyzed and monitoring frequency

Parameters	**Unit/indicator**	**Frequency**	
		Construction phase	**Operation phase**
Volume of waste generated	kg/month	Monthly	Quarterly
Percentage of recyclable waste	%	Monthly	Quarterly
Amount of hazardous waste	kg/month	Monthly	Quarterly
Final disposal of waste	Documentary verification	Monthly	Quarterly
Storage conditions	Visual inspection	Biweekly	Monthly

11.8.4 Monitoring method

- Segregation at source: Implementation of identified containers for different types of waste;
- Record of waste generated: Documentary analysis of the quantities and types of waste collected;
- Regular inspections: Verification of correct storage and transport of waste;
- Final destination analysis: Checking manifests and licenses of treatment and disposal operators;
- Periodic reports: Preparation of documents with monitoring data for internal control and environmental audits.

11.8.5 Responsibility

Contractor: Responsible for waste management during the construction phase, including segregation and disposal.

Carrinho, SA: Responsible for waste management during the operational phase, ensuring environmental compliance.

Environmental and Occupational Safety Technician: Responsible for monitoring and reporting.

Regulatory Agencies: Monitoring compliance with applicable environmental legislation.

11.9 BIODIVERSITY MONITORING PROGRAM

11.9.1 Objectives

- Assess the impacts of the construction and operation of the silos on local fauna and flora;
- Monitor possible changes in the region's ecosystems due to the project's activities;
- Identify and mitigate impacts on protected or endemic species;
- Ensure compliance with national and international environmental regulations;
- Promote biodiversity conservation and the sustainability of the project.

11.9.2 Justification

The construction and operation of silos can cause environmental disturbances, such as habitat loss, soil changes, and impacts on local wildlife;

- Monitoring biodiversity allows for the mitigation of negative impacts and the adoption of corrective measures to prevent environmental degradation;
- Meets legal requirements and good environmental practices required by regulatory agencies;
- Enables early detection of adverse impacts and the adoption of adaptive measures.

11.9.3 Parameters to be analyzed and monitoring frequency

Table 65: Parameters to be analyzed and monitoring frequency

Parameters	Unit/indicator	Frequency	
		Construction phase	**Operational phase**
Vegetation cover	% of vegetation removed vs. compensated areas	Semiannual	Annual
Terrestrial fauna	Record of species sighted and number of roadkill	Semiannual	Annual
Habitat quality	Degree of degradation of areas adjacent to the development	Quarterly	Annual
Presence of protected species	Occurrence of endangered species in the area of influence	Semiannual	Annual
Land use and habitat fragmentation	Extent of the impacted area	Semester	Annual

11.9.4 Methods

- Inventory of fauna and flora, comparing with data prior to the project;
- Monitoring using camera traps to identify mammals and birds in the area of influence;
- Analysis of vegetation cover using satellite images and drones to detect changes in vegetation;
- Interviews with local with andexperts to assess changes in biodiversity;
- Monitoring of ecological corridors to verify impacts on wildlife movement;
- Periodic reports with recommendations for corrective actions.

11.9.5 Responsibility

Carrinho, SA: Responsible for implementing and financing the program.

Environmental Management Team: Coordinates the execution of monitoring and the implementation of mitigation measures.

Specialized Environmental Consulting: Can be hired to conduct independent surveys and audits.

Local Environmental Agencies (Ministry of the Environment, Conservation Institutes, etc.): They supervise and validate the monitoring results.

Local Community and Environmental NGOs: Can contribute observations and information about changes in biodiversity.

11.10 EMERGENCY PLAN

11.10.1 Objectives

- Ensure the safety of workers, neighboring communities, and the environment in the event of incidents or disasters.
- Minimize the impacts of emergencies such as fires, hazardous product spills, explosions, structural collapses, and extreme weather events.
- Define clear procedures for rapid and effective response in emergency situations.
- Ensure compliance with national and international safety and environmental regulations.
- Train workers and stakeholders to respond effectively in emergencies.

11.10.2 Justification

- Grain storage can pose risks such as dust explosions, fires, environmental contamination, and structural collapse.
- The presence of heavy machinery and vehicles during construction and operation increases the likelihood of accidents.

- Compliance with environmental and safety regulations requires the implementation of emergency response plans.
- Proper preparation reduces financial, operational, and social risks arising from serious incidents.

11.10.3 Parameters to analyze and monitoring frequency

Table 66: Parameters to be analyzed and monitoring frequency

Parameters	Unit/indicator	Frequency	
		Construction phase	Operational phase
Fire risk	Storage conditions for flammable materials	Monthly	Quarterly
Explosion risk	Levels of suspended dust in silos	Monthly	Quarterly
Emergency training	Number of training sessions conducted and worker participation	Semiannual	Annual
Alert and response system	Alarm and firefighting system tests fire	Quarterly	Quarterly
Evacuation plan	Evacuation drills conducted	Semiannual	Annual
First aid	Verification of emergency kit availability	Monthly	Quarterly

11.10.4 Methods

- Preparation of an emergency response plan, detailing actions for each type of incident;
- Periodic training and simulations for workers and emergency response teams;
- Regular safety inspections to ensure that firefighting equipment, emergency exits, and ventilation systems are operational;
- Monitoring of air quality and airborne dust to reduce explosion risks;
- Continuous review of the plan to incorporate improvements based on audits and simulations;

- Coordination with local authorities and emergency services, ensuring a prompt response in case of need.

11.10.5 Responsibility

Carrinho, SA: Responsible for implementing and financing the plan.

Safety and Environment Team: Coordinates training, simulations, and maintenance of emergency equipment.

Local Emergency Services (Fire Department, Police, Health): Support incident planning and response.

Environmental and Safety Regulatory Agencies: Oversee implementation of the plan and compliance with current legislation.

Workers and Community: Must be aware of the plan's guidelines and participate in training and simulations.

11.11 PEST CONTROL AND EXTERMINATION PLAN

11.11.1 Objectives

- Establish preventive and corrective measures to minimize pest infestation in grain storage silos.
- Ensure the quality and safety of stored products, preventing economic losses and risks to public health.
- Comply with health and environmental standards applicable to grain storage.

11.11.2 Justification

The presence of pests, such as insects, rodents, and fungi, can compromise grain quality, causing losses due to contamination, deterioration, and disease transmission. Continuous monitoring allows for early detection and the adoption of effective measures to prevent the proliferation of these pests.

11.11.3 Parameters to be analyzed and monitoring frequency

Table 67: Parameter to be analyzed and monitoring frequency

Parameters	Unit/indicator	Frequency	
		Construction phase	Operational phase
Pest identification	Insects, rodents, and fungi	Biweekly inspections	Biweekly inspections
Storage conditions	Humidity, temperature, and ventilation	------------	Continuous monitoring
Effectiveness of control measures	Application of biocides and traps	-------------	Monthly assessment
Incident log	Occurrence of infestations and corrective actions	------------	Quarterly reports

11.11.4 Methods

- Regular visual inspections of silos and adjacent areas.
- Use of traps and baits to capture and monitor pests.
- Laboratory analysis of samples to identify fungi and insects.
- Application of preventive measures, such as humidity control and sealing off access points.
- Use of pesticides and integrated pest management, prioritizing less toxic alternatives.

11.11.5 Responsibilities

Contractor: will be responsible for implementing pest prevention measures on organic materials and waste that may attract infestations.

Carrinho, SA: responsible for implementing the plan during the operational phase, including hiring specialized pest control services and training workers in identification and proper handling.

Health and Environmental Authorities: Periodic inspection of compliance with standards and good storage practices.

11.12 MECHANISM FOR SUBMITTING THE EIAS MONITORING REPORT

11.12.1 Objectives

- Ensure the environmental and social compliance of the project as defined in the Environmental and Social Impact Assessment (ESIA);
- Ensure transparency and accountability to regulatory authorities and stakeholders;
- Monitor the effectiveness of mitigation measures implemented during the construction and operation phases;
- Identify possible deviations and propose corrective actions to minimize environmental and social impacts.

11.12.2 Justification

During the construction phase, it is essential to monitor the implementation of environmental and social measures to mitigate temporary impacts.

During the operation phase, reports will enable the continuous assessment of environmental and social impacts, ensuring the sustainability of the project.

Continuous monitoring and reporting are legal and regulatory requirements that must be complied with by Carrinho, SA.

11.12.3 Parameter to be analyzed and monitoring frequency

Table 68: Parameter to be analyzed and monitoring frequency

Parameters	Indicator	Frequency	
		Construction phase	Operation phase
Implementation of mitigation measures	% of measures implemented in accordance with the EIAS	Quarterly	Semiannual
Waste management	Volume and type of waste managed Correctly	Monthly	Quarterly
Water quality	Laboratory analysis results	Quarterly	Semiannual
Air quality	Atmospheric emission levels compared to legal standards	Quarterly	Semiannual
Noise levels	Comparison with limits established in legislation	Monthly	Quarterly
Stakeholder engagement	Number of meetings and consultations held	Quarterly	Semiannual
Worker safety and health	Number of incidents and accidents	Monthly	Quarterly

11.12.4 Method

- Field data collection, including environmental and social measurements;
- Laboratory analysis of effluents, atmospheric emissions, and air quality;
- Photographic and documentary records to demonstrate compliance;
- Documentary review of waste records, complaints, and community services;
- Preparation of periodic reports detailing monitoring results and recommendations;
- Presentation of reports to environmental authorities and regulatory agencies, as well as relevant stakeholders.

11.12.5 Responsibility

Carrinho, SA: Responsible for preparing and presenting reports.

Environmental and Social Management Team: Collects data, performs analyses, and structures reports.

Regulatory Bodies (Ministry of the Environment, Municipal Authority, Financiers, etc.): Receive and analyze reports.

Third-party environmental monitoring companies: Support in performing laboratory analyses.

Community and Workers: Contribute relevant information through communication channels.

11.13 ENVIRONMENTAL AND SOCIAL PERFORMANCE AUDITS

11.13.1 Objectives

- Assess the project's compliance with the environmental and social requirements established in the Environmental and Social Impact Assessment (ESIA);
- Identify non-compliance and propose corrective and preventive measures;
- Verify the effectiveness of the mitigation measures and monitoring programs implemented;
- Ensure compliance with current environmental and social legislation, as well as applicable international standards;
- Continuously improve the environmental and social management of the project.

11.13.2 Justification

During the construction phase, it is essential to ensure that activities are aligned with best environmental and social practices, minimizing negative impacts.

During the operational phase, audits enable continuous assessment of environmental and social performance, ensuring the sustainability of the project.

Periodic audits are a legal requirement and a good practice to ensure transparency and credibility in project management.

11.13.3 Parameters to be Analyzed and Monitoring Frequency

Table 69: Parameter to be analyzed and monitoring frequency

Parameters	Indicator	Frequency	
		Construction phase	**Operational phase**
Legal and regulatory compliance	Percentage of compliance with environmental and social standards	Semiannual	**Annual**
Implementation of mitigation measures	Degree of execution of actions proposed in the EIAS	Quarterly	Semiannual
Waste management	Volume and type of waste managed correctly	Quarterly	Semi-annual
Water and effluent quality	Compliance of analyzed parameters with environmental standards environmental	Quarterly	Semiannual
Air quality and emissions	Atmospheric emission levels compared to legal standards	Quarterly	Semiannual
Noise levels	Comparison with limits established in legislation	Quarterly	Semiannual
Relationship with the community	Number of complaints and mitigation measures adopted	Half-yearly	Annual
Occupational health and safety	Number of accidents and compliance with safety standards	Quarterly	Semi-annual

11.13.4 Methods

- Field inspections to verify the implementation of environmental and social measures;
- Interviews with workers and stakeholders to assess perceptions and identify problems;
- Laboratory analyses of water quality, atmospheric emissions, and effluents;
- Document review of waste management, occupational safety, community outreach, and environmental monitoring records;
- Application of audit checklists based on legal and regulatory requirements;
- Preparation of audit reports containing conclusions, recommendations, and corrective action plans.

11.13.5 Responsibility

Cart, SA: Responsible for conducting audits and implementing corrective actions.

Environmental and Social Management Team: Coordinates audits and ensures that recommendations are implemented.

External Environmental Consultant: May be hired to conduct independent and impartial audits.

Regulatory Bodies (Ministry of the Environment, Municipal Authority, financiers, etc.): Supervise and monitor reports and actions implemented.

Community and Workers: Can contribute information on observed environmental and social impacts.

11.14 COSTS OF IMPLEMENTING MONITORING PROGRAMS

The presentation of the costs associated with the implementation of the Monitoring Programs proposed in this environmental and social impact assessment (ESIA) is structured in two phases: Construction Phase and Operation Phase.

The financial costs related to the implementation of the monitoring programs during the construction phase will be borne by the contractor.

The costs of implementing the monitoring programs during the operational phase will be borne by Carrinho, SA.

Table 70: Program implementation costs

Programs	Estimated costs (annual)	
	Construction phase	Operational phase
Monitoring plan for effluents stored in septic tank	3,500 USD	8,200 USD
Worker health and safety plan	8,000 USD	10,000 USD
Program for monitoring emissions atmospheric and air quality	12,000 USD	15,000 USD
Noise level monitoring program	4,500 USD	6,000 USD
Environmental education program	12,000 USD	18,000 USD
Biodiversity monitoring program	7,500 USD	9,000 USD
Emergency plan	8,000 USD	16,000 USD
Waste monitoring and management program	4,500 USD	8,000 USD
Pest control and eradication plan		12,000 USD
Communication and stakeholder relations program stakeholders	18,000 USD	22,000 USD
mechanism presentation of reports EIAS monitoring reports	10,000 USD	12,000 USD
Environmental and social performance audits		20,000 USD
Total	**88,000 USD**	**156,200 USD**

12 INSTITUTIONAL CAPACITIES AND STRENGTHENING PLAN FOR THE IMPLEMENTATION OF PGAs

This chapter presents the Institutional Capacity Strengthening Plan, designed as a strategic tool to support the implementation of the Agricultural Infrastructure Construction Project for Grain Storage (Silos), to be executed in the municipality of Balombo, Benguela province, by the company Carrinho, S.A..

The relevance of this plan stems from the need to ensure that local, provincial, and national institutions, as well as the community actors directly involved, have the appropriate technical, administrative, and operational skills to guarantee the effectiveness, sustainability, and positive impact of the project. Institutional strengthening is therefore a cross-cutting theme of the Environmental and Social Management Plan (ESMP), contributing to good governance, compliance with environmental and agricultural legislation, and the creation of synergies between the different stakeholders.

In this context, the plan is geared towards:

- **Strengthen the technical and management capacities** of public and private entities linked to the agricultural and environmental sector;
- **Promoting institutional coordination** between the proposing company, supervisory bodies, local administrations, and beneficiary communities;
- **Ensuring knowledge transfer** through training, workshops, and continuous monitoring mechanisms;
- **Consolidate the operational sustainability of the silos**, ensuring that their use contributes to the socioeconomic development of the region and to national food security.

This chapter outlines the priority capacity-building actions, coordination mechanisms, and monitoring indicators that will enable not only the effective implementation of the project but also the creation of a lasting institutional legacy for the municipality of Balombo and the province of Benguela.

12.1 Identification of institutions involved and responsibilities

Through its food security, economic diversification, and agricultural production promotion policies, the Angolan government has been encouraging investment in grain storage silo infrastructure as an essential measure to ensure strategic reserves, reduce post-harvest losses, and improve the competitiveness of the agricultural sector. Therefore, we can affirm that the investments to be made in this sector by the Carrinho, SA group are in line with the Angolan government's main objectives in this sector.

This framework is part of instruments such as the National Development Plan (PND), the National Food and Nutrition Security Plan, the Program to Support Production, Diversification of Exports, and Import Substitution (PRODESI), and provincial agriculture and logistics strategies.

Among the strategic operational objectives for grain storage, the following stand out:

1. **Ensuring food security and reducing post-harvest losses**:
   - Increase storage capacity in areas of high agricultural production.
   - Reduce crop losses caused by a lack of adequate infrastructure.
   - Ensure the quality and preservation of grains over long periods.
2. **Strengthen the resilience of the agricultural sector to climate change and production crises**:
   - Build strategic reserves for periods of scarcity (drought, floods, pests).
   - Integrate silos into climate change adaptation and mitigation policies.
   - Ensure stability in domestic supply and support exports in times of surplus.
3. **Improving the efficiency of agricultural value chains**:
   - Coordinate grain production, transport, storage, and marketing.
   - Integrate silos into logistics platforms that support local, national, and international markets.
   - Foster public-private public-private to the financing and management infrastructure.
4. **Promote the environmental sustainability of silo operations**:

- Implement good pest control practices without negative environmental impact.
- Use energy-efficient technologies and, where possible, renewable energy.
- Ensure proper management of waste and effluents resulting from operations.

5. **Encourage innovation, research, and agricultural information**:
   - Create digital systems for monitoring agricultural stocks.
   - Support research into grain drying, ventilation, and preservation technologies.
   - Maintain registers and inventories up to date on the storage .
6. **Strengthen governance and institutional effectiveness in the agricultural sector**:
   - Clarify the responsibilities of state entities, cooperatives, and private operators.
   - Define management models that ensure the financial sustainability of silos.
   - Promote mechanisms for price regulation and balance between supply and demand.
7. **Ensure the participation of local producers and communities**:
   - Involve farmers' associations and cooperatives in the management and use of silos.
   - Encourage technical training programs for post-harvest management.
   - Improve coordination between central, provincial, and municipal levels to ensure territorial effectiveness.

The institutional framework below shows the main entities involved in policy-making, regulation, monitoring, and execution of activities related to the construction and operation of grain storage silos in Benguela province. The framework is organized by level: national, provincial, and local, highlighting roles and responsibilities.

Table 71: Main entities involved at the national level

Entity	Responsibilities
Ministry of Agriculture and Forestry (MINAGRIF)	National agricultural policy, post-harvest programs, and food security; oversees the extension system extension system and the IDA.
Institute for Agricultural Development (IDA)	Rural development and extension, technical support for storage and training for producers.
Ministry of the Environment (MINAMB)	Environmental regulations and licensing (EIA/PGAS); coordination of INGA.
Ministry of Economy and Planning (PRODESI)	Programs and financing lines for agro-industry industry and storage.
INIQ – National Institute for Quality Quality Structures	Standardization, metrology, and assessment of of silos and equipment.
National logistics infrastructure (Port/CFB/Lobito Corridor)	Grain transport and reception; integration port-rail-road.

Table 72: Main institutions involved at the provincial level

Entity	Responsibilities
Benguela Provincial Government	Policy coordination and intersectoral articulation .
Provincial Office of Agriculture, Livestock and Fisheries	Sectoral planning and support for storage
Provincial Office for the Environment	Monitoring of environmental licenses and PGAS inspection.
Angolan National Roads Institute (INEA)	Management, maintenance, and conservation of national roads national
Benguela Railway – E.P. (CFB)	Railway operation for grain flows and connection to the Lobito Corridor.

Table 73: Main institutions involved at the local level

Entity	Responsibilities
Municipal administrations	Land use planning, construction licensing, and public participation.
Local authorities and communities.	Oversee and collaborate in the implementation of silo projects, ensuring transparency, social inclusion, and the resolution of any conflicts of interest.
Civil society organizations.	Promote citizen participation, defend the interests of affected communities, and collaborate in the independent monitoring of the implementation of silo projects.
Municipal commissions for monitoring and supervising projects	Monitor the local implementation of silo projects, ensuring compliance with technical, environmental, and social standards, as well as coordination between the promoter, authorities, and communities.
EDAs / Agricultural Extension (IDA)	Direct technical assistance to producers (post-harvest, pests, loss management). harvest, pests, loss management).
Private operators/Cooperatives	Investment, silo operation, and compliance with quality, safety, and environmental standards.

12.2 Assessment of the institutional capacity of the body responsible for implementing the project

Technical training is a strategic element for the sustainability of the grain silo construction and operation project, ensuring that the human resources involved have the necessary skills to effectively manage agricultural infrastructure. Continuous training and strengthening of local capacities are crucial to ensuring operational efficiency, the quality of stored products, and compliance with environmental, safety, and public health standards.

In this context, grain silo management requires a multidisciplinary team of specialized technicians, notably:

Table 74: Human resources assigned to the cart group

Area of training	Total	Academic level	Experience
Civil engineers	2	Engineer	Yes
Mechanical	4	Engineer	Yes
Electricians	4	Engineer	Yes
Agricultural engineers	6	Technician	No
Environmental and Safety Technicians	3	Technical	Yes
Logistics and Operations Technicians	8	Technical	No
Food Quality Technicians	2	Technician	Yes
Financial and Administrative Managers	17	Higher	Yes
Operators	40	Technical	No
General Services	24	Basic	No

- **Civil and Mechanical Engineers** – responsible for the construction and maintenance of structures and ventilation, drying, and internal transport systems;
- **Agricultural Engineers** – specialists in post-harvest, quality, and grain conservation;
- **Environmental and Safety Technicians** – focused on compliance with the Environmental and Social Management Plan (ESMP), occupational risk prevention, and emergency management;
- **Logistics and Operations Technicians** – dedicated to the efficient reception, dispatch, and handling of grains;
- **Food Quality Technicians** – responsible for product inspection, fumigation, and certification;
- **Financial and Administrative Managers** – responsible for economic viability, cost control, and contract management, etc.

Strengthening these technical skills, combined with training programs and knowledge transfer, is essential to ensure that the project achieves its objectives in an efficient, safe, and sustainable manner.

12.3 Technical Capacity Building Plan

This technical capacity building plan aims to ensure that the promoter and partner institutions have the knowledge, tools, and skills necessary to ensure effective management, sustainability, and maximization of the socioeconomic and environmental benefits of the silo implementation project. Capacity building involves technical, operational, financial, and governance training, to be implemented at different stages of the project cycle.

Table 75: Training and capacity building plan

Training Area	Target Audience	Main Contents	Frequency	Supporting Entity
Infrastructure Management and Maintenance	Civil and mechanical engineers, maintenance technicians	Operation of ventilation, drying, and transportation systems; preventive and corrective maintenance corrective maintenance	Semiannual	Proponent + Professional Technical Institutes
Post-Harvest and Grain Quality	Agricultural engineers, food quality technicians food	Techniques for preservation, fumigation, classification, and certification of grains	Quarterly	IDA / INAQ
Environmental Management and Safety	Environmental technicians, safety and health managers safety and health	Implementation of the PGAS, risk prevention, emergency response emergencies	Annual	MINAMB / Environment Office Environment
Logistics and Operations	Logistics technicians, warehouse operators	Management of product entry/exit Product management, traceability, logistics contracts	Quarterly	Port of Lobito / CFB / Logistics companies
Financial and Administrative Management	Financial and administrative managers	Economic and financial planning financial planning, cost analysis, budget control	Annual	Commercial Banking / PRODESI
Governance and Community Participation Community	Local authorities, community representatives , NGOs	Transparency in management, community dialogue, conflict resolution conflict resolution	Annual	Municipal administrations / NGOs

12.3.1 Training plan within the scope of the PGAS

The training plan is an essential tool to ensure that everyone involved in the implementation and operation of the agricultural silo construction and management project is properly trained. The objective is to ensure compliance with the Environmental and Social Management Plan (ESMP), promote good environmental practices, strengthen occupational safety, and increase technical and operational efficiency. This training program will be targeted at different audiences, with appropriate frequency and support from competent institutions, in order to ensure the sustainability of the project.

Table 76: Training plan

Type of Training	Main Content	Target Audience	Frequency	Supporting Entities
Environmental and PGAS	Impact mitigation, waste management, monitoring, good practices	Environmental technicians, construction workers, silo operators	Initial + Annual recycling	MINAMB, Provincial Environment Office, Proponent
Occupational Health and Safety	PPE, firefighting, first aid, evacuation	All employees, HSE team	Initial + Annual refresher + Quarterly simulations Quarterly	INSS, Firefighters, HSE
Silo Operation and Maintenance	Ventilation systems, drying, transport, preventive maintenance	Mechanical engineers, operators of silos, maintenance technicians	Initial + Recycling every six months	Equipment manufacturers, IDA
Post-harvest management and quality	Grain classification, pest control, conservation a nd certification	Eng. agronomists, quality technicians, operators	Initial + Annual refresher training	INAQ, IDA
Community and social management	Communication, complaint management complaints, conflict resolution	Community representatives, NGOs, social managers	Annual workshops	Municipal administrations, NGOs
Logistics and warehouse management	Traceability, entry/exit of products, logistics contracts logistics	Logistics technicians, warehouse managers	Initial + Annual retraining	Port of Lobito, CFB, logistics operators
Governance and Ethics	Transparency, accountability, legal compliance	Managers of project, administrative managers	Initial + Annual refresher	MINFIN, PRODESI, NGOs

13 PUBLIC CONSULTATION AND PARTICIPATION

13.1 GENERAL CONSIDERATIONS

Public consultation is a mandatory step in the Environmental Impact Assessment process, as established by the Basic Environment Law (Law No. 5/98, of June 19), Presidential Decree No. 117/20, of April 22, and Executive Decree No. 87/12, of February 24, which regulate public participation in environmental matters. This procedure aims to ensure transparency, inclusion, and participation of communities, local authorities, and other stakeholders in the analysis of projects with potential environmental and social impact.

13.2 PURPOSE OF PUBLIC CONSULTATIONS

In the context of this Agricultural Infrastructure Construction Project “Silos”, public consultations aim to:

- Inform local communities, administrative authorities, and other stakeholders about the objectives, nature, location, and potential impacts of the project;
- Gather opinions, concerns, suggestions, and local knowledge that can contribute to improving mitigation measures and the project design itself;
- Promote dialogue and inclusive engagement of all relevant actors in order to strengthen social acceptance of the project and prevent future conflicts.
- Compliance with operational safeguard 1 of the project financing bank, etc.

13.3 LEGAL FRAMEWORK

Public consultations in the Environmental Impact Assessment (EIA) process are legally supported by Angolan law and are a mandatory and essential step to ensure the democratic and informed participation of communities and other stakeholders in the assessment of projects with potential environmental impact.

The main legal instrument governing this matter is Presidential Decree No. 117/20 of April 22, Regulation on the Environmental Impact Assessment Procedure.

This law establishes the principles, stages, and requirements of the EIA procedure and clearly defines the role of public consultations as a mechanism for participation and social inclusion**.** The following points are particularly relevant in this regard:

- **Article 20 (Public Participation)**:

  Establishes that the EIA process must ensure the effective participation of the public, particularly communities directly affected by the project, through
  appropriate consultation and communication mechanisms.

- **Article 21 (Public Consultation)**:

  Defines that public consultation must be carried out during the preparation of the Environmental Impact Study and/or during the technical analysis by the licensing authority. Responsibility for its organization and implementation lies with the project proponent, in coordination with the competent environmental authority.

- **Article 22 (Documentation and Dissemination of Public Consultation)**:

  It requires the proponent to prepare a **Non-Technical Summary of the EIA**, in clear and accessible language, to be made available to the public. The consultation must be widely publicized **at least 15 days in advance**, using effective means such as local radio stations, public notices, community networks, among others.

- **Article 23 (Public Consultation Report)**:

  Requires the preparation of a report containing the main comments, questions, and suggestions collected during the process, as well as the responses given and any changes to the project or study based on the contributions received. This report must be integrated into the assessment process and submitted to the Ministry of the Environment.

In addition to Decree No. 117/20, the **Basic Environment Law** (Law No. 5/98, of June 19), in its Article 10, also enshrines the principle of **public participation** as a right of citizens.

and a duty of the State, ensuring access to information and the involvement of citizens in the protection and management of the environment.

13.4 METHODOLOGY

The methodology adopted for conducting public consultations within the scope of this Environmental Impact Assessment (EIA) aims to ensure inclusion, transparency, access to information, and effective participation of stakeholders, as established in **Article 21** of Presidential Decree No. 117/20 of April 22.

1. Identification of Stakeholders

The process begins with the identification and mapping of stakeholders, including:

- Potentially affected local communities;
- Traditional and administrative authorities (communal and municipal administrations);
- Civil society organizations (agricultural, environmental associations, etc.);
- Representatives of vulnerable groups (women, youth, the elderly);
- Relevant technical entities and government institutions.

2. Preparation and Dissemination of Information

A Non-Technical Summary of the EIA was prepared in clear and accessible language. It

was disseminated through:

- Advertisements on community radio stations and social media accounts of the respective administrations;
- Communication with local authorities and community leaders;
- Delivery of physical copies of the summary to easily accessible locations (municipal administration)

3. Holding of Public Consultation Sessions

The sessions will be held in person in the communities covered by the project's area of influence, with the following structure:

- Presentation of the project and its objectives;
- Presentation of the main environmental and social impacts identified;
- Discussion of proposed mitigation measures;
- Opportunity for participants to ask questions, make comments, and offer recommendations.

During the sessions, representatives of the proponent, the EIA technical team, local authorities, and, where applicable, representatives of the Ministry of the Environment or delegated body will be present.

EIA technical team, local authorities and, where applicable, representatives of the Ministry of the Environment or delegated body.

4. Recording and Processing of Contributions

All contributions from participants will be recorded in writing or on audio/video, with the appropriate consent. A Public Consultation Report will be prepared, containing:

- List of participants and entities represented;
- Summary of issues raised;
- Responses provided by technical experts;
- Analysis of the integration of suggestions into the final version of the EIA.

5. Submission of the Report to the Competent Authorities

The public consultation report will be submitted together with the complete Environmental Impact Assessment to **the Ministry of the Environment** as part of the licensing process, in compliance with national legislation.

13.5 SUMMARY OF EVENTS

As part of the consultation process with the various stakeholders in the Agricultural Infrastructure Construction Project "Silos" in the province of Benguela, on June 13, 2025, the various local government entities associated with the municipalities where the projects will be implemented (Lobito, Balombo, and Ganda) were consulted, each with specific interests, in accordance with the AfDB requirements expressed in Operational Safeguard 1.

Among the local government institutions, the following were present:

- Provincial Vice-Governor;
- Administrator of Balombo;
- Administrator of Ganda (via Zoom);
- Administrator of Lobito (represented);
- Deputy Administrator for Technical and Infrastructure;
- Provincial Office for the Environment, Waste Management, and Community Services;
- Provincial Office for Integrated Economic Development;
- Provincial Office for Agriculture, Livestock, and Fisheries;
- Provincial Office for Infrastructure and Technical Services (represented);
- Media Office of the Provincial Government of Benguela.

The provincial environment department is a stakeholder in the project, acting as a supervisory body that will monitor the project's development, especially during the construction and operation phases.

The administrators, as the entity responsible for municipal administration and therefore representing the population of Lobito, Balombo, and Ganda, will be interested in learning about and monitoring the development of the construction and operation of agricultural infrastructure.

However, to facilitate the discussions, the proposed topics were presented concisely, adding the importance of sharing environmental and social safeguard documents related to the potential risks and impacts of the project.

Considering the interest of the participants, some concerns and contributions arose, which are summarized below:

The Administrative Bodies (Lobito, Balombo, and Ganda) highlighted the following elements:

Balombo Municipal Administration: Expressed gratitude, mentioning that the municipality already has experience with the "Carrinho Agri" and has land available for infrastructure. The

Administrator considers the project to be of great benefit and will provide all the support necessary to ensure its implementation.

Lobito Municipal Administration: The Lobito Administration highlighted the strategic advantage of being a port city, with designated hinterland areas. The municipality eagerly awaits the start of the project, believing that it will bring significant value to local communities.

Ganda Municipal Administrator: It was clarified that the project aims to increase the current grain storage capacity from 8,000 tons to 28,000 tons.

Provincial Office for Integrated Economic Development: The Provincial Office for Integrated Economic Development emphasized the project's alignment with the challenge of food self-sufficiency. It also highlighted the importance of the project's focus on production, storage, and processing in order to ensure grain quality and food security.

Provincial Office for the Environment, Waste Management, and Community Services: Expressed the importance of consulting with communities, reiterating that the project is extremely important and will bring great benefits. In terms of environmental impact, the project does not have any significant impacts.

Provincial Office of Agriculture, Livestock, and Fisheries: Expressed great optimism about the project, believing that it will address fundamental problems and ensuring the full support of the agricultural sector for its implementation.

Once the discussions were concluded and the questions raised clarified, the Carrinho, SA Group Team (i) reaffirmed its willingness to continue dialogue with the Provincial Government and the Municipal Administrations concerned; (ii) shared the presentation and other background documents and (iii) noted the need to work with the Provincial Government of Benguela in due course on the action plan within the framework of its social responsibility;

13.6 Record of Dialogue and Complaints (public consultation)

Following the presentation of the project on June 13, 2025, to the municipal administration of Benguela, each representative committed to sharing the information with the local community.

Therefore, on the twentieth day of February two thousand and twenty-six, at 9 a.m., in the Municipal Education Directorate Union Room, chaired by the Secretary General, Dr. João Tcombela Jaka, representing His Excellency the Municipal Administrator of Balombo, flanked by Mr. Anastâncio Pacheco, Legal Advisor to the Administrator's Office, Inocêncio Mussili, Director of the Media Office, Maria Isabel Vinombili, Municipal Director of Social Action, and Jorge Madeleno Chilombo Terças, Municipal Director for Integrated Economic Development, a meeting was held in partnership with representatives of the Carrinho Group a community consultation meeting to present the Group's Agricultural Infrastructure Project, which aims to build silos and warehouses for the packaging and storage of cereals at the municipal level.

In addition to the above-mentioned entities, members of the Community Consultation Council, traditional authorities, and representatives of civil society were also present at the event.

Taking the floor, Dr. João Tcombela Jaka began by greeting and welcoming those present, then gave the floor to the CARRINHO representative, Eng. Edmar Martins, who began the presentation and explanation of the Agricultural Infrastructure Project.

In turn, CARRINHO representative Edmar Martins outlined the project and its socioeconomic impact on the municipality of Balombo. According to Martins, the project aims to contribute to the revitalization and growth of the local agricultural sector, making the market more efficient and effective, with a direct impact on increasing the production of cereals and oilseeds and the consequent increase in the supply of goods to communities. The main environmental and social instruments related to the project were also presented, as well as its components, objectives, risks, and expected impacts.

When given the floor, community members began by congratulating the company on its initiative in choosing the municipality of Balombo for the implementation of the project, highlighting the municipality's agricultural potential and unanimously expressing their support for its implementation.

Finally, Dr. João Tcombela Jaka took the floor again to praise the initiative and encouraged the Carrinho Group to press ahead, emphasizing the importance of the project for increasing national productivity and promoting employability, especially in the municipality of Balombo.

A total of 54 (fifty-four) individuals were present, of whom 38 (thirty-eight) were male and 6 (six) were female.

Note 1: The public consultation sessions will continue to be comprehensive and inclusive at all stages of the project's implementation. The results of the public consultations will be sent in reports to the parties interested in the approval of the aforementioned projects, as well as updating this section in the EIAS.

Note: For proof of the activity described, see Annexes V, VI, VII, VIII, and IX.

14 TECHNICAL AND KNOWN GAPS

In general, the difficulties encountered during the preparation of this study are related to the lack of detailed information on some environmental descriptors (fauna, flora, and socio-economics), which are fundamental for determining the environmental and social impacts of the project's implementation.

Another factor is that, on many occasions during the preparation and construction phase, deviations from the original project occur that cannot be taken into account during the preparation of the Environmental and Social Impact Study. All these reasons contribute to the estimation of the degree of uncertainty, the magnitude of which is frankly difficult to assess.

Despite the difficulties mentioned above, this Environmental and Social Impact Assessment for the Balombo Silos Plant was prepared with rigor and objectivity in assessing the potential impacts of its construction and operation, as well as the potential environmental and social factors to be affected, and mitigation measures were defined to avoid and mitigate adverse impacts and enhance positive impacts.

15 CONCLUSIONS AND RECOMMENDATIONS

The construction of silos for grain storage represents a strategic investment for modern agriculture, providing significant benefits in terms of storage, conservation, and management of agricultural products. Silos not only protect grains from adverse factors such as pests and moisture, but also allow farmers to store their crops for extended periods, increasing efficiency and maximizing profitability.

In addition, the implementation of advanced technologies in the design and operation of silos can further optimize storage safety and efficiency, contributing to sustainable agricultural practices. Therefore, when planning the construction of a silo, it is essential to consider not only the initial costs but also the long-term returns and the positive impact on the production chain.

The various benefits for the local and surrounding community in terms of creating direct and indirect jobs and boosting the economy in various sectors, particularly agriculture, are noteworthy.

In terms of the environment, this environmental and social impact study focused mainly on analyzing the descriptors that may be affected by the actions resulting from the construction, operation, and decommissioning phases, either directly or indirectly, and mitigating and compensatory measures were taken to minimize or enhance the impacts.

During the construction phase, most of the impacts are considered to have been negative and insignificant, with the impacts resulting from the installation and use of the construction site, vehicle traffic, construction of buildings, and assembly of equipment, etc., being noteworthy. Positive direct and indirect impacts are also expected as a result of the revitalization of associated sectors of activity.

During the operation phase of the Silos Plant, the negative impacts identified will also be insignificant and will relate to soil sealing and its allocation, visual impact due to the presence of the Silos Plant in contrast to its surroundings, degradation of air quality due to greenhouse gas emissions, alteration of the natural landscape, and pressure on the electricity supply network and accessibility, etc.

Significant positive impacts are also expected in terms of socio-economics, job creation, the provision of various types of services, and the revitalization of associated sectors.

During the decommissioning phase, although insignificant negative impacts similar to those that will occur during the construction phase have been identified, the positive impacts in this phase outweigh them. This is because once the Silos Plant is decommissioned, the impact or pollution in the different descriptors analyzed is reduced and the probability of the environment returning to its undisturbed state increases.

According to the analyses carried out during this Environmental and Social Impact Study, the project is adequate in terms of environmental quality. The aspects identified as most vulnerable can be mitigated, requiring environmental control measures to be included in the executive project and correctly implemented.

It is recommended that those responsible for implementing the measures mentioned in this study apply them with the utmost rigor.

In short, the construction of this Silo Center is not only a practical solution, but an essential basis for food security and economic development in rural communities and beyond. Investing in grain storage infrastructure is investing in the future of agriculture.

Based on the study presented, no impact was identified that, in the opinion of the team that prepared this EIAS, questions the environmental viability of the project under normal operating conditions, considering the implementation of the proposed mitigation measures. The positive impacts remain throughout the entire period of operation of the project.

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- www.info-angola.ao
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17 ATTACHMENTS

I. Business License;
II. Publication in the Official Gazette;
III. Location sketch;
IV. Consulting Company Certificate Issued by the Ministry of the Environment.
V. Minutes of the Public Consultation Meeting
VI. Attendance list for the Public Consultation
VII. External communication
VIII. Dialogue and Complaints Register (public consultation)
IX. Attendance list

ANNEX IV-CONSULTANCY CERTIFICATE

REPÚBLICA DE ANGOLA

GABINETE JURÍDICO E INTERCÂMBIO

CERTIFICADO DE CONSULTORIA AMBIENTAL

N.º 14110503250

O Gabinete Jurídico e Intercâmbio do Ministério do Ambiente, atesta que foram cumpridas todas as formalidades legais conducentes ao Registo Técnico da Sociedade de Consultoria Ambiental HSG - CONSTRUCAO, ENG. E COMERCIO ,LDA, nos termos do Decreto Executivo nº 86/12, de 23 de Fevereiro de 2012, que aprova o Regulamento sobre o Registo Técnico de Sociedade de Consultoria Ambiental.

Emitida em,	Válida até,
29 de Abril de 2025	29 de Abril de 2026

Assinatura

MINISTÉRIO DO AMBIENTE Gabinete Jurídico e Intercâmbio

MIRANDA CANDIDO KIALA

(DIRECTOR DO GABINETE JURÍDICO E INTERCÂMBIO)

A autenticidade deste documento poderá ser verificada através dos passos a seguir:
1. Aceda ao Portal MINAMB (https://sia.minamb.gov.ao/validacaodocumentos)
2. Introduza o código **RCCONST-OTI2NTYxNTg=** no campo "Código de Validação"
3. Clique em "Pesquisar"

Número do Certificado: **14110503250**

ANNEX V-MEETING MINUTES

	ACTA DE REUNIÃO CONSULTA PÚBLICA: PROJECTO DE INFRA-ESTRUTURAS AGRÍCOLAS	GOVERNO DE ANGOLA MINISTÉRIO DO AMBIENTE 2030 CARRINHO

REUNIÃO DE CONSULTA PÚBLICA PARA APRESENTAÇÃO DO PROJECTO E INSTRUMENTOS AMBIENTAIS E SOCIAIS			
Província: Benguela		**Municípios:** Lobito, Balombo e Ganda	
1. OBJECTIVOS			
○ Dar a conhecer o Projecto e as suas actividades associadas; ○ Recolher contribuições (feedback) e as eventuais sugestões, bem como eventuais preocupações sobre o projecto.			
2. INFORMAÇÕES/TEMAS APRESENTADOS NA CONSULTA PUBLICA			
▪ Apresentação dos instrumentos Ambientais e Sociais relevantes no Projecto; ▪ Componentes e respectivos objectivos do Projecto; ▪ Riscos e Impactos, Ambientais e Sociais referentes ao Projecto; ▪ Expectativas e Preocupações relativas a Projecto.			
Local da Reunião:	Governo Provincial da Benguela	Benguela	
Data: 13/06/2025	**Hora Inicio:** 08h:30	**Hora término:** 12h:00	
3. SOBRE OS PARTICIPANTES			
Entidades/Orgãos Consultadas		Dono da Obra – Carrinho SA	
Vice-Governador Provincial, *Adilson Dellany Martins Gonçalves;* *Administrador do Balombo- José Cambiete;* *Administrador da Ganda- Francisco Prata (via zoom);*	Nº de Participantes (Consultados) (desagregados por sexo: 9 (Homens 8 e 1 Mulher)	**Nome**	**Função**
		Samuel Candundo	*Executive Board (ESG* Committee *Member)*
		Lissandro Filipe	*Administrative Director (ESG Committee Member)*
		Maria Filomena Silva Melo	Director of Quality and Corporate Affairs (ESG Committee Member)
		Euclides Calenga	Environmental, Social, Manager

ACTA DE REUNIÃO

CONSULTA PÚBLICA: PROJECTO DE INFRA-ESTRUTURAS AGRÍCOLAS

Administrador do Lobito (representado) – Administrador adjunto Técnico e infraestrutura - António Alberto dos Santos César; Gabinete Provincial do Ambiente, Gestão de Resíduos e Serviços Comunitários -Marisa Kinzimba; Gabinete Provincial do Desenvolvimento Económico Integrado-Samuel Maleze Quinda; Gabinete Provincial da Agricultura, Pecuária e Pesca-Leilande da Costa; Gabinete Provincial de Infraestructuras e Serviços Técnicos (representado)- Adriano Paixão Mbinja; Gabinete de Comunicação Social do Governo Provincial de Benguela-Job Seque Seque Alfredo André.		Alede da Cunha	Compliance - Legal Affairs Environmental and Social Requirements Specialist (Agriculture)

4. RESUMO DA ACTIVIDADE E PRINCIPAIS CONTRIBUTOS

Com intuito de dar a conhecer o Projecto de Infra-estruturas Agrícolas e suas respectivas componentes, bem como recolher sugestões inerentes á sua implementação, participaram os órgãos públicos da Administração (Lobito; Balombo e Ganda), conforme as datas acima referenciadas, de modo presencial.

No entanto, para facilitar os debates, foram apresentados, concisamente, as abordagens dos temas propostos, adicionado da importância da partilha dos documentos de salvaguardas ambientais e sociais, relacionados com os potenciais riscos e impactos do projecto.

Considerando o interesse dos participantes, surgiram algumas preocupações e contribuições das quais, de forma resumida, se apresentam a seguir:

Os ***Órgãos da Administração (*Lobito; Balombo e Ganda*)*** destacaram os seguintes elementos:

- **Administração Municipal do Balombo**-Expressou gratidão, mencionando que o município já possui experiência com a "**Carrinho Agri**" e dispõe de terrenos cedidos para infraestruturas. O Administrador considera que o projeto é um grande benefício e que assegurará todo o apoio para garantir a implementação do projecto.

ACTA DE REUNIÃO
CONSULTA PÚBLICA: PROJECTO DE INFRA-ESTRUTURAS AGRÍCOLAS

- **Administração Municipal do Lobito**-A Administração do Lobito destacou a vantagem estratégica de ser uma cidade portuária, com zonas de retro-porto já designadas. O município aguarda ansiosamente o início do projeto, acreditando que trará um valor significativo as comunidades locais.
- **Administrador Municipal da Ganda-** Ficou esclarecido que o projecto visa aumentar a capacidade actual de armazenamento dos grãos de 8 mil toneladas para 28 mil toneladas.
- **Gabinete Provincial do Desenvolvimento Económico Integrado-** O Gabinete Provincial do Desenvolvimento Económico Integrado, enfatizou o alinhamento do projeto com o desafio da autossuficiência alimentar. O Gabinete Provincial do Desenvolvimento Económico Integrado ressaltou a importância do projecto em se focar na produção, armazenamento e transformação de forma a garantir a qualidade dos grãos e a segurança alimentar.
- **Gabinete Provincial do Ambiente, Gestão de Resíduos e Serviços Comunitários-**Expressou a importância da auscultação com as comunidades, reiterando que o projeto é de extrema importância e trará grandes benefícios. Em termos de impacto ambiental, o projecto não apresenta impactos significativos.
- **Gabinete Provincial da Agricultura, Pecuária e Pesca-**Demonstrou grande otimismo em relação ao projeto, acreditando que este responderá aos problemas fundamentais e garantiu o apoio total do setor da agricultura para a sua concretização.

5. ENCONTROS DE CONSULTAS PÚBLICAS COM REPRESENTANTES DO GOVERNO DE BENGUELA: REGISTO FOTOGRÁFICO (SE AUTORIZADO)

6. EQUADRAMENTO LEGAL DO PROJECTO: LEGISLAÇÃO ANGOLANA RELEVANTE NESTA CONSULTA PÚBLICA

- Decreto Presidencial nº 200/22 de 23 de Julho de 2022 - O Plano Nacional de Fomento para a Produção de Grãos (PLANAGRÃO).
- Decreto Presidencial nº 117/20 de 22 de Abril de 2020 - Regulamento Geral de Avaliação de Impacte Ambiental e do Procedimento de Licenciamento Ambiental.
- Decreto Executivo n.º 87/12 de 24 de Fevereiro de 2012 - Regulamento de Consultas Públicas dos Projectos Sujeitos à Avaliação de Impacte Ambiental.

	ACTA DE REUNIÃO CONSULTA PÚBLICA: PROJECTO DE INFRA-ESTRUTURAS AGRÍCOLAS	GOVERNO DE ANGOLA MINISTÉRIO DO AMBIENTE 2030 CARRINHO

7. DOCUMENTO PARTILHADOS PELO DONO DA OBRA COM AS PARTES INTERESSADAS NA CONSULTA PÚBLICA

1) Apresentação do Projecto Carrinho *"Infra-Estruturas Agrícolas"*.
2) Políticas Grupo Carrinho – ESMS.
3) Standards (Procedimentos) "Chave" Grupo Carrinho – ESMS (Consulta Pública).
4) Resumo dos Relatórios Técnicos e Não Técnicos dos Estudos de Impacto Ambiental e Social (Subprojectos: Infraestruturas Agrícolas - Silos de Grão), referentes aos Municípios: Lobito, Balombo e Ganda.
5) Consulta Pública - Registo de Diálogo e Reclamação.

8. ASSINATURAS DOS PARTICIPANTES

Nome	Assinatura
[illegible] Gonçalves	[illegible]
[illegible]	12.6.2025
José [illegible]	
Marisa [illegible]	[illegible]
Samuel Malesa Quinda	[illegible]
[illegible] da Costa	Costa
[illegible] Seque A. André	
Samuel Cangungo	[illegible]
[illegible] Dionis Futal	[illegible]
[illegible]	[illegible]
Alcide da Cunha	[illegible]
Euclides Calenga	Calenga
ADRIANO Paixão [illegible]	[illegible]

ANNEX VI-ATTENDANCE LIST

REPÚBLICA DE ANGOLA
Governo Provincial de Benguela
Gabinete do Vice-Governador para os Serviços Técnicos e Infra-Estruturas

LISTA DE PRESENCA

DATA: __/__/____

Nº	NOME	ORGANISMO	FUNÇÃO	CONTACTO	CORREIO ELECTRÓNICO
1	Adilson Gonçalves	GPB	VGSTI	923583554	adhellany@hotmail.com
2	Augusto Alberto dos Santos Coim	AML	ADM. ADJ. Tec. [illegible]	935743436	Augusto alberto Coim@gmail.c
3	José Cambiete	Administração M. Balombo	Administrador Municipal	923389992	jose.cambiete@2017hotmail.com
4	Samuel Malege Quinda	GPDEI	Director	922965500	malegequinda@gmail.com
5	Marta [illegible]	GPAGRSC	Directora	923521827	[illegible]@outlook.[illegible]
6	[illegible] P. H. da Costa	GPAPP	Director	927300791	[illegible]
7	João Segue Segue Alfredo André	GCS / Gov. Benguela	Chefe de Departamento	937075671	joaosegue[illegible]@gmail.[illegible]
8					
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19					

Gabinete do Vice-Governador / Serviços Técnicos e Infraestrutura
Governo Provincial de Benguela
Rua de Timor
Telef: 244 272234041
E-mail: gvg.ie@benguela.gov.ao
Benguela-Angola
www.benguela.gov.ao

ANNEX VII-EXTERNAL COMMUNICATION

07:46

Publicação de Governo Provincial de Benguela

Governo Provincial de Benguela · Seguir

15 h ·

GOVERNO PROVINCIAL DE BENGUELA E GRUPO CARRINHO AVALIAM PROJECTO AGRÍCOLA

O Vice-Governador de Benguela, Adilson Gonçalves, recebeu uma delegação do Grupo Carrinho para analisar o Projecto de Infra-estruturas Agrícolas a ser implementado nos municípios do Lobito, Balombo e Ganda.

A reunião visou apresentar os Instrumentos Ambientais e Sociais do projecto e recolher contribuições das comunidades. A iniciativa prevê o aumento da produtividade agrícola, promoção do emprego local e mitigação de impactos ambientais.

O Vice-Governador destacou a importância do projecto para o desenvolvimento da província. O Grupo Carrinho, representado por Samuel Candundo, informou que as obras começarão após aprovação legal pelo Ministério do Ambiente.

O Governo Provincial reafirmou o compromisso com o desenvolvimento sustentável e conta com a participação activa das comunidades.

GABINETE DE COMUNICAÇÃO SOCIAL DO GOVERNO PROVINCIAL DE BENGUELA

Alda Gouveia + 92 4 comentários 4 partilhas

Gosto Comentar Partilhar

07:47

Publicação de Governo Provincial de Benguela

3

Gosto Comentar Partilhar

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Gosto Comentar Partilhar

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Gosto Comentar Partilhar

ANNEX VIII-DIALOGUE AND COMPLAINTS REGISTER (PUBLIC CONSULTATION)

	REGISTO DE DIÁLOGO E RECLAMAÇÕES CONSULTA PÚBLICA	GOVERNO DE ANGOLA 2030 CARRINHO

FORMULÁRIO PARA REGISTO DE DIÁLOGO E RECLAMAÇÕES	
Identificação do Projecto/Actividade: Projecto de Infraestruturas Agrícolas	
Nome: Carrinho SA	
Nº de Telefone: ____ Outro meio de contacto: ____	Género: ☐ M ☐ F Idade: ____
Comunidade: Balombo	Posto Administrativo: Sala de Reuniões do Sindicato da Educação
Comuna: Sede	Província: Benguela
Data de Recepção: 20/02/26	Data de Recepção: 20/02/26

RESUMO DO CONTEÚDO

Aos vinte dias do mês de fevereiro de dois mil e vinte e seis, pelas 9 horas, na Sala do Sindicato da Direcção Municipal da Edução, sob Presidência do Secretário Geral, **Dr. João Tcombela Jaka**, em representação da Sua Excelência Administrador Municipal do Balombo, ladeado pelos Srs. **Anastâncio Pacheco** Assessor Jurídico do Gabinete do Administrador, **Inocêncio Mussili**, Director do Gabinete de Comunicação Social, **Maria Isabel Vinombili**, Directora Mucipal da Acção Social e **Jorge Madeleno Chilombo Terças,** Director Municipal para Desenvolvimento Económico Integrado, realizou-se, em parceria com representantes do Grupo Carrinho, um encontro de auscultação às comunidades para a apresentação do Projecto de Infraestruturas Agrícolas do Grupo, que visa a construção de silos e armazéns para o acondicionamento e armazenamento de cereais a nível do município.

Para além das entidades acima referidas, fizeram-se também presentes no certame os membros do Conselho de Auscultação da Comunidade, Autoridades Tradicionais e representantes da Sociedade Civil.

Ao tomar a palavra, o **Dr. João Tcombela Jaka** começou por saudar e dar as boas vindas aos presentes, tendo de seguida passado a palavra ao representante da CARRINHO, o **Eng. Edmar Martins**, que deu início a apresentação e explicação do Projecto de Infraestrutura Agrícolas.

Projecto Estratégico - Infraestruturas Agrícolas 1

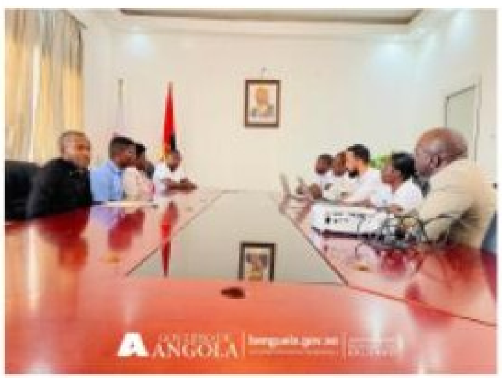
Por sua vez, o representante da CARRINHO, Eng. Edmar Martins, fez o enquadramento do Projecto, bem como o seu impacto socioeconómico para o município do Balombo. De acordo com o responsável, o Projecto visa contribuir para a dinamização e crescimento do sector Agrícola local, tornando o mercado mais eficiente e eficaz, com impacto directo no aumento da produção de cereais e sementes oleaginosas e o consequente aumento da oferta bens às comunidades.

Também, foram apresentados os principais instrumentos ambientais e sociais relacionados ao Projecto, bem como os seus componentes, objectivos, riscos e impactos previstos.

Dada a palavra aos membros da Comunidade, estes começaram por parabenizar a iniciativa da empresa em escolher o município do Balombo para a implementação do Projecto, realçando as potencialidades agrícolas do município e manifestaram de forma unânime o apoio à sua implementação.

Por fim, o **Dr. João Tcombela Jaka** retomou a palavra para enaltecer a iniciativa e encorajou o Grupo Carrinho a prosseguir com firmeza, sublinhando a importância do Projecto para o aumento da produtividade nacional e para a promoção da empregabilidade, sobretudo a nível do Município do Balombo.

ENCONTRO DO CONSELHO MUNICIPAL DE AUSCULTAÇÃO DAS COMUNIDADES DO BALOMBO: REGISTO FOTOGRÁFICO



Projecto Estratégico - Infraestruturas Agrícolas 3

Projecto Estratégico - Infraestruturas Agrícolas 4

Administração Municipal do Balombo
· Seguir
2 d ·

APRESENTADO O PROJECTO INFRA-ESTRUTURAS AGRÍCOLA NO BALOMBO

O grupo Carrinho apresentou nesta sexta-feira 20.02.2026, na sala de reuniões do Sindicato da Educação, aos Agricultores e aos representantes das cooperativas, do município do Balombo, o projecto Infra-estruturas agrícola que visa melhorar as políticas de conservação de cereais.

Durante o encontro, foram apresentados os principais instrumentos ambientais e sociais relacionados ao projecto, bem como os seus componentes, objectivos, riscos e impactos previstos. A reunião teve ainda como propósito ouvir as expectativas e preocupações da comunidade relativamente à implementação do projecto.

A sessão visou apresentar o Projecto de Infra–estruturas Agrícolas e os respectivos Instrumentos Ambientais e Sociais, com o intuito de dar a conhecer as suas actividades, recolher contribuições e sugestões, bem como eventuais preocupações associadas.

Na ocasião, o Secretário Geral, João Tchombela Jaka, em representação do Administrador Municipal do Balombo José Cambiete, enalteceu a iniciativa e encorajou o Grupo Carrinho a prosseguir com firmeza, sublinhando a importância do projecto para o aumento da produtividade nacional e para a promoção da empregabilidade, sobretudo no Município do Balombo.

Por sua vez, o Eng.º Edmar Martins, Director Geral de Agronomia do Grupo Carrinho, que apresentou o projecto, informou que, foi financiadas acções nos municípios do Lobito, Balombo e Ganda, já registados no programa do grupo.

GABINETE DE COMUNICAÇÃO SOCIAL DA ADMINISTRAÇÃO MUNICIPAL DO BALOMBO.

ASSINATURAS DOS PARTICIPANTES

ANNEX IX-ATTENDANCE LIST

REPÚBLICA DE ANGOLA

GOVERNO PROVINCIAL DE BENGUELA

ADMINISTRAÇÃO MUNICIPAL DO BALOMBO

LISTA DE PRESENCA

Nº	NOME	INSTITUIÇÃO	TELEMÓVEL
1.	João E. [illegible] Maria	ADM-Balombo	949566598
2.	José [illegible]	ADM/DMTPCT	917444602
3.	[illegible] K.M. [illegible]	ADM G.C.S	923805455
4.	Guilherme [illegible]	E. [illegible]	924929618
5.	[illegible] Julião	[illegible]	925101125
6.	Victor Agostinho	[illegible] Hoxya Henda	940721642
7.	Estevão Lopes	Maka [illegible]	921527033
8.	Gaspar Zacarias	Hossi ya Henda	922468133
9.	José António Manuel	Kahala Camuna Sede	927753875
10.	[illegible]	[illegible] Sede	922094008
11.	Cooperativa 3 de Junho	[illegible]	923491538
12.	Francisco [illegible]	[illegible]	[illegible]
13.	Benjamim Chimuco Kapingala	Coop. [illegible]	943279837
14.	[illegible]	[illegible]	925530588
15.	[illegible] Rodrigues	[illegible]	934043185
16.	[illegible]	[illegible]	936640419
17.	Frederico [illegible]	[illegible] - ECA	925990265
18.	Emília [illegible] Manico	[illegible] mulher	928041496
19.	José [illegible]	[illegible]	923687130
20.	Manuel [illegible]	K. [illegible]	913917880
21.	[illegible]	Coop. [illegible]	926465878
22.	José Augusto	Coop. [illegible]	921121560
23.	[illegible]	" " "	945333618
24.	Domingos José Barros	Coop. [illegible]	927 845159
25.	Fernando Antunes	Coop. [illegible]	948220226
26.	José [illegible]	[illegible]	940577740
27.	Domingos [illegible] Wanga	[illegible]	[illegible]
28.	[illegible] Joaquim Cardoso	E[illegible]	933032286
29.	Rafael Pedro Soba	[illegible]	
30.			
31.	Felisberto [illegible]	" " "	
32.	[illegible] Quintas	[illegible]	[illegible]
33.	Felisberto Luís Domingos	sede [illegible]	[illegible]
34.	Maria Isabel [illegible]	ADM Direção M. A. Social	945646650
35.	[illegible]	ADM	[illegible]
36.	João [illegible]	ADM - Secretária G.	932871006

37.	Alex Eduardo da Cunha	G. CARRINHO	925574402
38.	Adriano Cambumba	G. CARRINHO	923383335
39.	Dilva J. J. Manuel	G. CARRINHO	934574969
40.	Filipe Faustino	Regedor Municipal	933450733
41.	José Catral	Soba geral da sede	
42.	Inocêncio Baptista	Ajudante de regedor	941545455
43.	João Alberto	Soba Geral	935322165
44.	José Virgílio Jaime	Soba regional Cotane	944450784
45.	Veríssimo José	Sobo Nhequele	
46.	Tomas Luis	T. Nomveso	
47.	Domingos Júlio	Kalilongue	94903936
48.	Venâncio Paulo Mbala	4 de Abril	922264479
49.	Eduardo Domingos	17 de Dezembro	925924246
50.	Luciano Paulo	Kanhala II	930106592
51.	[illegible]	[illegible]	[illegible]
52.	Zeferino Neves Cacuto	Bunguera	943368740
53.	Paulo da Silva	G. Carrinho	923867970
54.	Agostinho C. B. Rochiongui	A.P.L.	936348205
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