Simplified Environmental & Social Impact Assessment

CABEOLICA EXPANSION PROJECT – Component 4 in São Vicente Island, Cabo Verde

Cabeolica SA

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Executive Summary[1]

Project Background

Cabeolica, a Private-Public-Partnership between the Government of Cabo Verde, Electra S.A. and Infraco Limited, is a wind energy company in Cabo Verde that owns and operates four (4) independent windfarms, each on one of four islands of the Cabo Verde Archipelago: Sal, São Vicente, Boa Vista, and Santiago. These windfarms began producing energy commercially by May 2012 and have operated continuously; however, they shed considerable levels of produced energy due to insufficient demand loads on the islands.

Currently, Cabeolica plans to maximize the delivery of all available energy and reduce the risk of losing potential revenue through the Expansion Project, which will reduce diesel spinning reserve operation by incorporating Battery Energy Storage Systems (BESS) to maximize renewable energy penetration in each of the islands and increase existing production capacity with the addition of three new wind turbines at the Santiago windfarm. The Expansion Project will improve the decarbonization and diversification of the country's energy matrix and will allow for a more stable grid system to reduce the frequency of blackouts in the country.

The **Cabeolica Expansion Project**, to be implemented on the four islands, comprises the following:

- Component 1: Expansion of the Cabeolica Santiago Wind Farm with three (3) wind turbines with a total net additional power capacity of about 13.5 MW.
- Component 2: Battery Energy Storage System (BESS) of approximately 6 MW / 6 MWh storage capacity for spinning reserve and control, and short-term storage to be installed at the Cabeolica Santiago wind farm.
- Component 3: BESS of approximately 6 MW / 6 MWh storage capacity for grid stability control and short-term storage to be installed at the Cabeolica Sal wind farm.
- Component 4: BESS of approximately 8 MW/8 MWh storage capacity for grid stability control and short-term storage at São Vicente Island, located close to ELECTRA Lazareto Power Station approximately 3.7 km from São Vicente windfarm.
- Component 5: BESS of approximately 6 MW/6 MWh storage capacity for grid stability control and short-term storage at Boa Vista Island, located close to *Águas e Energía de Boa Vista* (AEB) Parcela Power Plant in an industrial area approximately 8.5 km from the Boa Vista windfarm.

The present document is focused on the **Cabeolica Expansion Project to be implemented in São Vicente (Component 4)**.

[1] N.B. This Executive Summary condenses the salient information and findings of the ESIA carried out for the Cabeolica Expansion Project as given in Simplified Environmental & Social Impact Assessment CABEOLICA EXPANSION PROJECT – Component 4 in São Vicente Island, Cabo Verde (Report Document No. 06106-416041-47260-B-06-0024, Rev. D, 14 February 2025). As an integral and indissociable element of that Report, it does not replace, modify or add to the information and findings given in the body of the Report. In the event of any inconsistencies between the Executive Summary and the Report, the latter is the sole document of record. No Reliance can be placed on this Executive Summary alone.

Purpose and Scope of the Report

The scope of the present document is to comply with the Cabo Verde national legal requirements for submitting a Simplified ESIA, and to meet European Investment Bank (EIB) and the African Development Bank (AfDB) applicable standards, both by assessing potential impacts of the Project and project-related activities on the biophysical and socio-economic environment, as well as defining the required mitigation measures to avoid or minimise negative impacts and enhance potential benefits. Furthermore, another purpose in to establish a systematicapproach to stakeholder engagement to ensure that appropriate project information of E&S risks and impacts are disclosed to stakeholders in a manner and format that are timely, understandable, accessible, appropriate and proportionate to the E&S risk categorisation.

In the above context, the potential significant environmental and social impacts of the projects were identified and assessed (Section 7), in order to provide the basis for the mitigation and monitoring requirements (Section 8) and the Environmental and Social Management Plan (See Appendix A). Apart from the applicable legal and regulatory framework presented in Section 2, the study took into consideration the specific environmental and social baseline conditions of the study area as summarized in Section 6 and the in-country diagnosis (See Appendix B).

This Simplified ESIA was prepared based on desktop information and complemented with information gather in the previous ESIA *Implementation of Battery Energy Storage Systems projects, São Vicente and Boa Vista islands* prepared by the company FUTURE Proman, S.A in 2021 and which included a site visit conducted in August 2021. A further survey for the biological environment was not deemed necessary given the information provided by the 2021 study is recent (within the last 3 years) and valid for the site location and the limited scale of any potential impacts.

Furthermore, a Stakeholder Engagement Plan (SEP) for the entire Cabeolica Expansion Project was prepared following AfDB principles, EIB Standards and Cabo Verdean legislation (See Appendix C) and a stakeholder engagement meeting was held in São Vicente on August 1st, 2024, to introduce Cabeolica and the Project to stakeholder. All available information about the Project was provided with an overview of identified potential environmental and social impacts and the mitigation measures proposed to address them. At the meeting in São Vicente, stakeholders were also asked to provide previously unidentified impacts and to suggest mitigation measures to improve the quality of the Simplified ESIA.

Institutional and Legal Framework

The National Directorate of Environment in the Ministry of the Agriculture and Environment (DNA) is responsible for validating the environmental impact assessment (EIA) of projects in Cabo Verde. The DNA also has attributions and authority to contribute toward the definition of national environmental policy, to participate in the elaboration of plans, programs and projects regarding activities related the environmental and natural resources, and to define measures for the evaluation of air quality, water quality, and background noise levels.

The main legal instruments applicable to the development of this Project from environmental and social perspectives are the following:

- Environment Policy Base Law (Law No. 86/IV/93) establishes the foundations of Cabo Verdean environmental policy.
- Legislative Decree No. 14/97, of July 1st has the main objective to optimise and guarantee the use of natural resources.
- Decree-Law No. 27/2020, of March 19th establishes the legal regime, in the context of Environmental Integral Authorization (AIA).

The National Environmental Impact Assessment Authority, *Direção Nacional do Ambiente*, confirmed the project categorization[2] for Component 4 according to National Decree-Law No. 27/2020 in June 2023. The project is considered as a "new" activity and are defined as Category B, which require a Simplified Environmental and Social Impact Assessment.

The Cabo Verdean Electric System is regulated by the *Agência Reguladora Multisectorial da Economia* (Multisectoral Regulation Agency of Economy – "ARME"), and covers the activities of generation, transmission, distribution and supply of electricity, including "independent generation", Energy sector legislation applicable to the project is summarised below:

- Decree-Law No. 1/2011, January 3rd on the promotion, access, licensing, and development of electrical energy from renewable sources.
- Decree-Law 54/1999, of August 30th, establishing the basic law for the Electric System of Cabo Verde, modified by Decree 14/2006, of February 20th and Decree-Law 4/2013, of January 29th.
- The Strategic Plan for Renewable Energies (*Plano Estratégico Sectorial das Energias*, PESER), approved by Resolution No.7/2012.
- The Master Plan of the Electricity Sector for 2018-2040 (Plano Director do Sector Eléctrico 2018-2040), approved by Resolution 39/2019, of April 8th ("PDSE").
- The National Program for Sustainable Energy (NPSE), which was launched within the framework of the country's Strategic Plan for Sustainable Development (2017-2021).

Project Description

The Cabeolica Expansion Project to be implemented in São Vicente (Component 4), plans to maximise the delivery of all available energy and reduce the risk of losing potential revenue. The BESS will be installed adjacent to ELECTRA Lazareto Power Station to fulfil the objectives of reducing the need to curtail renewable energy production in Cabo Verde and improving the dynamic frequency control.

The main project components and auxiliary developments for the Cabeolica Expansion Project at São Vicente are described below.

- A modular Battery Energy Storage System (BESS) comprised of: three sets of two battery containers (6), three (3) inverters (PCS), three (3) step-up transformers, one (1) MV substation, one (1) warehouse of 30 m^2, one (1) LV room and control house, three (3) temperature transformers, and one (1) parking area.
- Electrical connection: The BESS will require the installation of a single 20kV 3-phase underground circuit to the existing substation at ELECTRA Lazareto Power Station (approximately 400 m length).

The scope of work of the project encompasses development, design, engineering, procurement, manufacture, financing, construction, permitting, completion, testing, commissioning, insurance, ownership, operation, and maintenance.

[2] *Categorizaçao Ambiental BESS* –São Vicente, June 2023.

Project Alternatives

The consideration of project alternatives allows for determining whether there are reasonable options to develop the Project, whilst maintaining an appropriate balance between technical and commercial feasibility and environmental and social mitigation costs. An overview of the main choices taken by Cabeolica after assessing the alternatives for the BESS Project is provided in Section 4 of the document.

During previous project phases, two potential sites that were preliminarily identified were evaluated for São Vicente BESS: Lazareto Power Station and Matiota Substation. After considering that Matiota Substation is within an industrial area in Mindelo with limited space available to install the BESS and that the location at Lazareto will serve as a strategic storage point for several integrated substation and networks, the Lazareto was confirmed as the preferred site.

Regarding technology alternatives, Lithium-ion batteries were selected as the chosen energy storage technology option.

Finally, the "no action" alternative -understood as maintaining the status quo and not embarking on the Project – was considered.

Environmental and Social Baseline Conditions and In-Country Diagnosis

The main environmental and social baseline conditions of the area of influence of BESS Project and potential sensitivities identified through the Description of the Baseline Environment (Section 6), are summarized in the following tables. Appendix B presents additional information regarding in-Country Diagnosis in terms of environmental, social and climate change issues. This appendix also presents country context-related information relevant to specific social-related risks at project level, such as human rights, gender profile, gender-based conflicts and labour conditions. The analysis of country-context-related information did not identify any potential significant social risks.

Table 0-1 Environmental Baseline conditions

Environmental Parameters	Baseline conditions
Climate	The island has a dry tropical climate with trade winds from November to July, and irregular precipitation during the rest of the year. Average annual temperature is approximately 24.8ºC and the average annual precipitation is 189 mm. Dominant winds are from the northeast, reaching average speeds of 20 km/h.
Topography	The project area is a plateau with minor slope (0% to 10%).
Hydrography and groundwater	Evidence of surface water bodies and groundwater abstraction is not encountered at the Lazareto site. This situation was confirmed during fieldwork carried out in August 2021 for the previous ESIA prepared in 2021 by the company FUTURE Proman, S.A.
Geology and soils	The Lazareto site falls within an area of Holocene dune - sand cover. The land is mostly in dune area and marginally in a very arid pasture area. Lithological materials that most directly influence the geology and soils of the site are essentially of eruptive origin.
Air quality	Potential sources of air emissions in the vicinity of the site, within 250 meters of the center point are, the Electra Power Station a civil construction site, a carpentry workshop, a transportation company (Polaris), a detergent production company (Químicas Cintila, Lda), a fish canning and fish feed production factory (large). The paved road connecting the airport with Mindelo is approximately 30 m west of the project area, and an unpaved access road is about 100 m south of the area. The

Environmental Parameters	Baseline conditions
	former is a source of vehicle emissions and the latter of dust particles from the passage of vehicles.
Noise	The main source of noise is the traffic on the paved road, with low frequency except during periods of entry and exit of the industrial facilities in the area. Sensitive receptors (i.e., residential areas) were not identified within 200 m of the site. The Lazareto village is approximately 300 m from the site to the north.
Protected areas	Designated protected areas are not located within the area of influence of the BESS site. The closest environmental protected area is the Natural Park of Monte Verde, at 8 km east of the Lazareto site.
Flora	Flora in Lazareto site is sparse with some individuals of Acácia americana (*Prosopis juliflora)* (Least Concern LC as per IUCN) (90% of the vegetation coverage). Invasive species, such as *Nicotiana glauca* (Charuteira) and *Datura stramonium*, are also present.
Fauna	**Avifauna:** Two (2) avifauna species were inventoried in BESS site area: Cabo Verde sparrow (*Passer iagoensis)* and spectacled warbler (*Curruca conspicillata*), both classified as LC by IUCN and the first one endemic to Cabo Verde. However, the Lazareto BESS site does not support or contain habitat conducive to nesting or feeding for these species. **Reptiles and mammals:** The reptile community in São Vicente is represented by two species, both endemic of Cabo Verde: *Chioninia stangeri* and São Vicente wall gecko (*Tarentola substituta)*, which is only endemic to São Vicente Island and classified as LC by IUCN. Although the site is included in the geographic range of these species, their presence could not be confirmed during the 2021 visit. Mammals are represented by one rodent species, *Mus musculus*, and two species of bats, *Pipistrellus kuhlii* and *Pipistrellus hesperidus*, however none were observed during the site visit for the 2021 ESIA.

Table 0-2 Social Baseline conditions

Social Parameters	Baseline conditions
Population	São Vicente is the second most populated island in Cabo Verde. The Lazareto site is in the municipality of São Vicente, approximately 300 m from the residential area of Lazareto in the north of the island and has a population of 449 inhabitants.
Health	Health infrastructures in São Vicente consists in one central hospital, 6 health centers, one reproductive health center, three base health units and one health delegation. The central hospital, *Hospital Dr Baptista de Sousa*, is in Mindelo.
Economy	Population in São Vicente Island mainly lives in urban areas (93%) and depend on activities such as the industry, the commerce and the construction. Tourism is an economic activity of growing importance on the island. The island is characterized by an average 10% unemployment rate, which is lower than the total Cabo Verdean average (21%).
Infrastructure	The water for human consumption in São Vicente Island is produced by ELECTRA (public supply network) and supplies to the 70.68% of the population. The rest of the population is supplied by the neighbours, tankers, fountains or wells. On São Vicente, the percentage of the population with a wastewater disposal system was about 85.5%, and more than 98% of the population has a method of disposing solid urban waste. Access to electricity for illumination is 92.27% in the island, and most of the electricity is produced and distributed by Electra.

Social Parameters	Baseline conditions
	The Lazareto site is in an industrial area, close to the Electra Lazareto Power Station, several industries and shipyards in the surroundings, a paved road west of the study area, and an access road to the south. Roads leading from the delivery Port (a 5-km route, approximately) are tar-sealed and support heavy vehicular traffic. The study area is in service to a road associated with the Mindelo-São Pedro Airport and to an aeronautical route associated with this airport.
Land use	Currently, the Lazareto site has no human occupation and has a surface cover of light scrub. The BESS site is categorized an a "New Industrial Area" by the EROT-SV Territorial Model Plan for São Vicente Island and as Zone C (areas with urban environment or characterized by large infrastructures and facilities). The EROT-SV identifies the Lazareto site as a flash flood risk zone.
Landscape	The visibility of the site is not impacted by obstacles, and there are no relevant elements of landscape appreciation. The landscape of the site and its immediate surroundings presents low visual quality and poor visual absorption capacity, resulting in a medium visual sensitivity.
Cultural heritage	According to the previous ESIA (2021), the BESS site has no visible cultural heritage (either tangible or intangible) with historical or archaeological values. The potential presence of cultural heritage along the electrical connection corridor is currently unknown.

Environmental and Social Aspects of Routine Activities

Environmental and Social Aspects are elements of the activities, products or services of an organization that can interact with the environment. Environmental Aspects can affect positively or negatively on the biotic, abiotic, and socioeconomic environments within the area of influence of the project, resulting in impacts due to the project.

The following environmental and social aspects derived from the project activities were assessed in this Simplified ESIA.

Table 0-3 Main Project Routine Aspects

Project phase	Project Aspects
Pre-construction and construction phases	Site preparation, clearing and earthworks
	Installation of BESS: civil works, and electrical and mechanical works
	Transport of materials, equipment, waste and/or personnel
	Purchase of supplies, services, goods, and generation of job opportunities
	Restoration of temporary work areas
Commissioning, operation, and maintenance phase	Testing and commissioning of new equipment
	Physical presence of new component (BESS)
	Operation and maintenance of new component (BESS)
	Transport of goods, equipment, waste and/or personnel
	Purchase of supplies, services, goods, and generation of job opportunities
	Power storage
Decommissioning phase	BESS disconnection, isolation and removal
	Transport of materials, equipment, waste and/or personnel
	Purchase of supplies, services, goods, and generation of job opportunities
	Site restoration

Summary of main environmental and social impacts and risks

The Cabeolica Expansion Project at São Vicente will result in environmental and social impacts due to the following, as identified and summarized in the following subsections:

- Normal routine operations
- Non-routine operations (major accidents) and natural disasters (if they were to occur).
- Cumulative effects with other developments present within the area of influence of the Cabeolica Expansion Project at São Vicente.

Environmental and social impacts of routine activities

The significance of routine impacts was evaluated based on the impact magnitude, which are assessed following the method proposed by Conesa (2010) adapted by Advisian, and the importance of Valued Receptors (VR). A detailed description of the impact assessment methodology is included in the Simplified ESIA. Routine impacts were assessed as **COMPATIBLE**, **MODERATE**, **SEVERE**, **CRITICAL** or **POSITIVE**.

Positive impacts

Positive impacts identified per project phase for the Cabeolica Expansion Project at São Vicente are summarized in Table 0-4. The **pre-construction and construction phases** may create potential employment and skills development opportunities for local community members: it is expected a workforce of 10 for the Project in São Vicente and where possible it will be sourced locally. Construction-related opportunities are likely to be limited to low skilled jobs and will be temporary in nature. The presence of personnel in the area could increase local demand for goods and some construction materials from local suppliers, which may positively impact local trade.

During **operation**, 5 indirect jobs will be created. These workers will be sourced by the BESS provider and will be involved in the occasional and planned maintenance activities during a period of 15 years (with the possibility of being extended to 20 years to cover all the battery life period). Furthermore, the Project will contribute to fuel savings and improved decarbonization factors by installing a spinning reserve operated BESS. Another benefit is the reduced use of fossil fuels and the subsequently reduced emissions of greenhouse gases.

Table 0-4 Summary of positive impacts

Project phase	Valued Receptor	Impact	VR Assessment	Impact Significance
Pre-construction and Construction	Local Economy	Creation of employment, skills development, and business opportunities	MEDIUM	POSITIVE
Commissioning, Operation and Maintenance	Global Climate and Air Quality	Reduction in CO_2 emissions due to increased capacity and storage	MEDIUM	POSITIVE
	Local Economy	Creation of employment, skills development, and business opportunities	MEDIUM	POSITIVE

Negative impacts

None of the negative impacts were assessed to be CRITICAL (i.e., above acceptable thresholds that would imply a permanent loss of environmental conditions without recoverability regardless of corrective measures), SEVERE (i.e., requires corrective measures to return to original conditions and recoverability period is medium- or long-term) nor MODERATE (i.e., does not require intensive preventive or corrective measures and the period needed to return to original conditions is not long) prior to the implementation of mitigation measures. All the potential negative impacts have been assessed as COMPATIBLE before the implementation of mitigation measures for routine project activities.

Anticipated Non-Routine Impacts (Risk Assessment)

Non-routine impacts (major accidents and natural disasters) are unplanned occurrences under abnormal conditions with a probability of occurrence that is not negligible. These were assessed following a risk assessment process focused on accident scenarios with environmental and socioeconomic consequences. Risk severity is assessed as MINOR, MODERATE, HIGH, or URGENT based on the risk level assigned. The risk ratings under each scenario that was assessed before the implementation of prevention and mitigation measures, based on a combination of their frequency of occurrence and their environmental and social consequences in each case, are as follows:

- Fire and explosion accidents (HIGH Risk).
- Accidents / Collision of vehicles (LOW Risk).
- Leaks and spills of hazardous substances and waste (MODERATE Risk).
- Occurrence of flash floods in São Vicente Island (HIGH Risk).

Mitigation Measures designed to prevent and minimize risks from non-routine events include, but are not limited to, the following:

- Develop and implement an Emergency Response Plan (ERP) and Health and Safety Plan (HSE) for all facilities (MiN 1).
- Implement the Cabeolica Grievance Mechanism to address potential grievances/concerns of interested third parties in a timely manner throughout the implementation of the Project. All contractors will follow, and integrate proportionally, the Cabeolica GRM procedures, where relevant, into their Project environmental and social management plans and systems (MiN 3).
- Implement the Cabeolica and EPC contractor training programmes as given in the E&S Manual and EPC contract to ensure that personnel onsite respond in a timely manner to accidents, incidents and in the event of an emergency (MiN 7).
- Appropriate equipped first-aid stations will be easily accessible throughout the site (MiN 9).
- Ensure that regular inspections and maintenance of electrical equipment and fittings are carried out to avoid the risk of fire, as per Cabeolica Health, Safety and Environment (HSE) plan (MiN 10).
- Provide fire and explosion protection, suppression and relief equipment, and suitable personal protective equipment (PPE) (MiN15).
- Implement best practices for mitigating BESS hazards, which may include the following: Hazard Mitigation Analysis (HMA); Smoke and fire detection; Fire control and suppression; Explosion control; Gas detection; Thermal runaway protection; Size and separation requirements; Water supply; Explosion prevention systems; and Deflagration venting (MiN 16).
- Ensure driver safety training are provided and verify driver qualifications (MiN 17).
- Vehicles and other equipment shall be subjected to regular maintenance and inspections to avoid spills and leakage of fuels and lubricants (MiN20).
- Implementation of Cabeolica Expansion Project Waste Management Plan (WMP) (Doc. No. 06106-416041-47260-B-06-0029) (MiN 27).
- Design site drainage (during construction, and then for the operational stage) to account for the likely Storm Event Intensity for the area (MiN 29).
- Alignment with Cabo Verde Emergency Preparedness and Response Plan (MiN 30).

Assuming the implementation of proposed mitigation measures, the significance of all risk scenarios will be reduced to MINOR to ALARP (As Low As Reasonably Practicable).

Cumulative Impacts

Cumulative impacts resulting from successive, incremental and/or combined effects from the project when added to other existing activities in the vicinity of the BESS site were also assessed.

The existing activities in the vicinities of the Lazareto BESS site are summarized in Table 0-5.

Table 0-5 Activities and infrastructures in the vicinity of Lazareto site

Project in the vicinity	Remarks
ELECTRA Lazareto Power Station	Located northeast of BESS site.
Industries and shipyards	Industries and shipyards are located in the surroundings of the study area (within about 250 m), e.g., Carpilux Servios de Carpintaria, Químicas Cintila, Tecnicil Indústrial S.V., and Armazem Polaris CIA.
Mindelo-San Pedro Airport Road	The paved road connects São Vicente airport with Mindelo and extends west of the project area.

Cumulative impacts of the Project were assessed as COMPATIBLE in all cases and not significant for all phases of the project lifecycle.

Mitigation Measures, Monitoring Plan and Environmental and Social Management Plan (ESMP)

The potential impacts on Valued Receptors resulting from the BESS Project can be reduced to a lower significance by following a series of recommended mitigation measures. The simplified ESIA presents the proposed mitigation measures, with specific recommendations for routine impacts (Section 8.1.1) and non-routine impacts (Section 8.1.2), to be integrated into the project through the commitments made in the Monitoring Plan, described in Section 8.2.

Monitoring activities, including monitoring location(s), indicator/evidence, frequency and responsibility are proposed for all project phases. During the operation phase, monitoring activities of new BESS components will be integrated into the current monitoring activities conducted by Cabeolica as part of the annual environmental and social monitoring report to be submitted to *Direção Nacional do Ambiente*. Monitoring activities during the BESS decommissioning phase will be similar to those proposed for pre-construction and construction and will be incorporated into the Decommissioning Plan for the Project.

Appendix A includes the Environmental and Social Management Plan (ESMP), which provides the framework for implementing measures to eliminate, reduce and mitigate negative impacts that have been identified for the Cabeolica Expansion Project at São Vicente to acceptable levels and to promote and enhance positive impacts. This Appendix is a stand-alone document which includes a summary of the main environmental and social impact and risks, along with mitigation and monitoring measures included in the Simplified ESIA and defines roles and responsibilities, training and capacity building initiatives, reporting requirements and indicators, along with a schedule and a budget for the implementation of the São Vicente ESMP.

Conclusions

In summary, several relevant impacts from routine operations and non-routine events were identified by this simplified ESIA. The main anticipated impacts due to the Cabeolica Expansion Project on São Vicente will be minimised by implementing the proposed mitigation measures, which will be accomplished and monitored through the Environmental and Social Management Plan (ESMP).

The present Simplified ESIA accounts for the foreseeable potential environmental and social impacts of the BESS Soa Vicente component. Following GIIP and the Lenders Requirements, the level of detail presented in the assessment is commensurate and proportionate to those potential impacts and the risks identified along the EA process.

Acronyms and Abbreviations

Acronym	Definition
AfDB	African Development Bank
AIA	Environmental Integral Authorization
AIDS	Acquired Immunodeficiency Syndrome
ALARP	As Low As Reasonably Achievable
ARME	*Agência Reguladora Multisectorial da Economia*
BAT	Best Available Techniques
BESS	Battery Energy Storage System
CABEEP	Cabo Verde Appliances & Building Energy-Efficiency Project
CBD	Convention on Biological Biodiversity
CITES	Convention on International Trade in Endangered Species of wild fauna and flora
CMS	Convention on Migratory Species
COVNM	Non-metallic Volatile Organic Compounds
DAOI	Direct Area of Influence
DGASP	*Direção Geral de Agricultura, Silvicultura e Pequária*
DNA	*Direção Nacional do Ambiente*
DNOT	National Spatial Planning Directive (*Directiva Nacional do Ordenamento do Território*)
ECS	Environmental, Climate and Social
EEZ	Exclusive Economic Area
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPC	Engineering Procurement and Construction
EROT	Regional Spatial Planning Scheme (*Esquema Regional do Ordenamento do Território*)
ERP	Emergency Response Plan
ESA	Environmental and Social Assessment
ESAP	Environmental and Social Assessment Procedures
ESHS	Environmental, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan

Acronym	Definition
ESMS	Environmental and Social Management System
EU	European Union
EEZ	Exclusive Economic Area
FAO	Food and Agriculture Organization
FCCC	Framework Convention on Climate Change
GDP	Gross Domestic Product
GBV	Gender-Based Violence
GHG	*Greenhouse Gas*
GIIP	Good International Industry Practice
GRM	Grievance Redress Management
HFC	Hydrofluorocarbons
HHS	Hygiene Health and Safety
HIV	Human Immunodeficiency Virus
HMA	Hazard Mitigation Analysis
HSE	Health, Safety and Environment
HVAC	Heating, Ventilation and Air Conditioning
ICP	Informed, Consulted and Participate
IAOI	Indirect Area of Influence
IFC	International Finance Corporation
ILO	International Labour Organization
INE	National Statistics Institute
INGT	National Institute of Territory Management (*Instituto Nacional de Gestão do Território*)
INMG	National Institute of Meteorology and Geophysics
ITG	Territorial management instruments (*Instrumentos de Gestão Territorial*)
ISO	International Standard Organization
IUCN	International Union for Conservation of Nature
KPI	Key Performance Indicator
LPM	Labour Management Procedures
MESA	Environmental, Social and Administration Manager
MFS	Minimum Functional Specification

Acronym	Definition
MPA	Marine Protected Areas
MSDS	Material Safety Data Sheet
MSG	Minimum Synchronous Generation
NDC	Nationally Determined Contribution
NIP	*Número de Identificação Predial*
NGO	Non-governmental organization
NPSE	National Program for Sustainable Energy
OE	Owner's Engineer
OS	Operational Standard
OSH	Occupational Safety and Health
PA	Protected Areas
PCS	Power Conversion System
PDM	Municipal Master Plan (*Plano Director Municipal*)
PDSE	Master Plan of the Electricity Sector (*Plano Director do Sector Eléctrico*)
PEDS	Strategic Plan for Sustainable Development (Plano Estratégico de Desenvolvimento Sustentável)
PESER	*Plan Estratégico Sectorial de Energías Renovaveis*
PM	Particulate Matter
PPE	Personal Protective Equipment
POOCM	Coastal Zone and Adjacent Sea Management Plan (*Plano de Ordenamento da Orla Costeira e Mar adjacente*)
PoR	Point of Reference
RCM	Request for Categorization Memorandum
RE	Renewable Energy
SCADA	Supervisory Control and Data Acquisition
SDG	Sustainable Development Goals
SEP	Stakeholder Engagement Plan
SGR	Smart Grid Roadmap
SIDS	Small Island Developing State
SNSP	System Non-Synchronous Penetration
SOC	Statement of conditions

Acronym	Definition
SRES	Special Report on Emissions Scenarios
STD	Sexually Transmitted Diseases
TSO	Transmission System Operator
UN	United Nations
UNCCD	UN Convention to Combat Desertification
VAC	Violence Against Children
VOC	Volatile Organic Compound
UNFCCC	United Nations Framework Convention on Climate Change
VR	Valued Receptor
WMP	Waste Management Plan

1 Introduction

1.1 Identification of the project and promoter

Cabeolica, a Private-Public-Partnership between the Government of Cabo Verde, Electra S.A. and Infraco Limited, is a wind energy company in Cabo Verde that owns and operates four (4) independent windfarms, each on one of four islands of the Cabo Verde Archipelago: Sal, São Vicente, Boa Vista, and Santiago. These windfarms began producing energy commercially in May 2012 and have operated continuously; however, they shed considerable levels of produced energy due to insufficient demand loads on the islands.

Currently, Cabeolica plans to maximize the delivery of all available energy and reduce the risk of losing potential revenue through the Expansion Project, which will reduce diesel spinning reserve operation by incorporating Battery Energy Storage Systems (BESS) to maximize renewable energy penetration in each of the islands and increase existing production capacity with the addition of three new wind turbines at the Santiago windfarm. The Expansion Project will improve the decarbonization and diversification of the country's energy matrix and will allow for a more stable grid system to reduce the frequency of blackouts in the country.

The **Cabeolica Expansion Project**, to be implemented on the four islands, comprises the following:

- Component 1: Expansion of the Cabeolica Santiago Wind Farm with three (3) wind turbines with a total net additional power capacity of about 13.5 MW.
- Component 2: Battery Energy Storage System (BESS) of approximately 6 MW / 6 MWh storage capacity for spinning reserve and control, and short-term storage to be installed at the Cabeolica Santiago wind farm.
- Component 3: BESS of approximately 6 MW / 6 MWh storage capacity for grid stability control and short-term storage to be installed at the Cabeolica Sal windfarm.
- Component 4: BESS of approximately 8 MW/8 MWh storage capacity for grid stability control and short-term storage at São Vicente Island, located close to ELECTRA Lazareto Power Station approximately 3.7 km from São Vicente windfarm.
- Component 5: BESS of approximately 6 MW/6 MWh storage capacity for grid stability control and short-term storage at Boa Vista Island, located close to AEB Parcela Power Plant in an industrial area approximately 8.5 km from the Boa Vista windfarm.

The present document is focused on the **Cabeolica Expansion Project to be implemented in São Vicente (Component 4)**.

The scope of work of the project encompasses development, design, engineering, procurement, manufacture, financing, construction, permitting, completion, testing, commissioning, insurance, ownership, operation, and maintenance.

1.2 Identification of the licensing authority

The EIA licensing authority is the National Directorate of Environment (*Direção Nacional do Ambiente*, DNA), part of the Ministry of Agriculture and Environment.

According to Cabo Verde legislation, the project was designated as Category B in June 2023 by the National Directorate for the Environment (*Direção Nacional do Ambiente*, DNA) applying the environmental criteria included in Annex II of the national Decree-Law No. 27/2020. According to this

Annex, Category B projects pose at least one specific risk that is categorized as Medium. Category B projects require a **Simplified Environmental and Social Impact Assessment (ESIA)** as per the specifications in Annex VIII and must comply with public consultation requirements detailed in Article 15 of the national Decree-Law.

1.3 Purpose of the Report

The purpose of this Simplified ESIA is to:

- Comply with national legal requirements for submitting a Simplified ESIA,
- Comply with European Investment Bank (EIB) and African Development Bank (AfDB) requirements, detailed in Section 2.3,
- Assess potential impacts of the Project and project-related activities on the biophysical and socio-economic environment,
- Design mitigation measures to avoid or minimise negative impacts and enhance potential benefits, and
- Establish a systematic approach to stakeholder engagement to ensure that appropriate project information of E&S risks and impacts is disclosed to stakeholders in a manner and format that are timely, understandable, accessible, and appropriate.

1.4 Technical team and elaboration time

This Simplified ESIA was prepared between September and February 2025 by Advisian in coordination with Pedro Oliveira Ramos, an Environmental Engineer and registered consultant by the DNA. The technical team members are listed in Table 1-1.

Table 1-1 Identification of the team responsible for the Simplified ESIA

Technician's name	Responsibility	Education	Entity
Pedro Oliveira Ramos	Coordinator of Simplified ESIA	Environmental Engineering	Registered Consultant
Jon Evans	Environmental Assessment Team Lead	Chemistry and Engineering Geology, BSc, MSc	Advisian
Andrea Lázaro	Senior Environmental Consultant	Environmental Sciences, BSc, MSc, PhD	Advisian
Isabel Martínez	Senior Environmental Consultant	Environmental Sciences, BSc, MSc	Advisian
Lina Osorio	Junior Environmental Consultant	Chemical Engineering, BSc, MSc	Advisian

2 Legal Framework

This Simplified ESIA was designed to meet national and international legislation requirements, especially those established by the European Investment Bank (EIB) and the African Development Bank (AfDB), and applicable standards, as described below.

2.1 National legislation and sectoral plans

The following institutional bodies are responsible for environmental issues in Cabo Verde:

- The National Assembly through the Specialized Commission for Agriculture, Environmental, Energy and Water.
- The Government through the Ministry of Agriculture and Environment, involving bodies such as the National Directorate for the Environment (*Direção Nacional do Ambiente,* DNA).
- Municipalities through the departments of the Environment and Environmental Municipal Technical teams.
- Miscellaneous non-governmental organisations (NGOs).

The National Directorate of Environment in the Ministry of the Agriculture and Environment is responsible for validating the environmental impact assessment (EIA) of projects in Cabo Verde. The DNA also has attributions and authority to contribute toward the definition of national environmental policy, to participate in the elaboration of plans, programs and projects regarding activities related the environmental and natural resources, and to define measures for the evaluation of air quality, water quality, and background noise levels.

The main legal instruments applicable to the development of this Project from environmental and social perspectives are the following:

- Environment Policy Base Law (Law No. 86/IV/93) establishes the foundations of Cabo Verdean environmental policy based on the principle of prevention, which is focused on reducing or eliminating the causes and correcting the effects of actions or activities that could adversely affect the quality of the environment.

  Articles 30, 31 and 32 establish the objectives and the contents of environmental impact studies.

- Legislative Decree No. 14/97, of July 1st has the main objective to optimise and guarantee the use of natural resources, both qualitatively and quantitatively, as a basic premise for autonomous sustainable development and guaranteeing the right of citizens to live in a healthy and ecologically balanced environment. This decree makes it a duty to safeguard and preserve the environment by conferring on the state and municipalities the responsibility to improve the quality of life for both the individual and the community.

- Decree-Law No. 27/2020, of March 19th establishes the legal regime, in the context of Environmental Integral Authorization (AIA), applicable to projects susceptible to affect the environment. This more recent regulation establishes changes in EIA process, such as the categorisation of projects according to an environmental risk profile.

The National Environmental Impact Assessment Authority, *Direção Nacional do Ambiente*, confirmed the project categorization[3] for Component 4 according to National Decree-Law No. 27/2020 in June 2023. The project is considered as a "new" activity and are defined as **Category B**, which require a Simplified Environmental and Social Impact Assessment.

Other legislation applicable to the Project are summarised below:

- Decree-Law 3/2003, February 24th, on Protected Areas Management, and its amendment Decree-Law No. 44/2006 establish the legal regimen for natural spaces, landscapes, monuments, and other spaces that merit special protection and should be included in the National Network of Protected Areas due to their ecological function, importance in conserving biodiversity, and intrinsic interests from socio-economic, cultural, and scientific perspectives.
- Law 102/III/90 of December 29th establishes the bases for what is to be considered cultural and natural patrimony.
- Law 25/X/2023 establishing the General Policy Framework for Forestry sector, which repealed Law 48/V/98 of April 6th, regulates all forest related activities, establishes the attributions of the State, and defines instruments of intervention, forest regulations, declassification, the management of specially protected areas and state and private lands subject to forest regulations, planting and forestry operations, expropriation, incentives, and support for participation in forestry activities, policing, infractions, and penalties.
- Decree-Law No. 56/2015, which repealed Decree-Law 31/2003 of September 1st, establishes the essential requisites to be considered in the elimination of solid urban, industrial, and other waste, and the surveillance thereof to protect the environment and human health. In addition, the Decree-Law No. 32/2016 approving the National Strategic Plan for Waste Management (2015-2030) specifies the strategic guidelines and objectives and the programme, review, monitoring, and follow-up plan under the new legal framework applicable to the prevention, production, and waste management, approved by Decree-Law No. 56/2015.
- Resolution No. 35/IX/2017 implementing, at the National level, the Agreement on Climate Change and approves and ratifies for its implementation the Agreement on Climate Change signed on December 2015 in Paris.
- Laws related to the quality of air and water, specifically Decree-Law 5/2003 of March 31st defining the national air protection and control system, Legislative Decree No. 3/2015 of October 19th approving the Water and Sanitation Code, Decree-Law 8/2004 of February 23rd regulating water quality and classification criteria and norms, and Decree-Law 7/2004 of February 23rd regulating the discharge of waste waters.
- Decree-Law No. 8/2022 of April 6th, which repealed Decree-Regulation No. 7/2002 of December 30th, establishes the conservation and protection measures for endangered flora and fauna species.
- Laws related to the exploitation of inert substances: Decree-Law 2/2002 of January 21st, which prohibits the removal and use of sand from dunes, beaches, and waters along the coastline and in Cabo Verde territorial waters, and Decree-Law 6/2003, of March 31st, which establishes the legal regimen for the licensing and utilisation of rock quarries for profit.
- Law 34/VIII/2013, of July 24th for the prevention and control of noise pollution to safeguard rest, health, tranquillity, and well-being of the population. This law is focused on the wellbeing of

[3] *Categorizaçao Ambiental BESS* – São Vicente, June 2023.

populations and applies to any permanent or temporary noisy activities that might disturb local neighbours, and regulates municipal planning, noise production, and sanctions imposed for illegal activities.

- Law related to risk disasters management: Law No. 28/2003 on the Basic Law on Civil Protection.
- Legislation related to social protection: Law No. 131/V/2001 on the Basic Law of Social Protection and Decree-Law No. 33/2022 establishing the social income for emergency inclusion.

The Cabo Verdean Electric System is regulated by the *Agência Reguladora Multisectorial da Economia* (Multisectoral Regulation Agency of Economy – "ARME"), and covers the activities of generation, transmission, distribution, and supply of electricity, including "independent generation", which covers the producers authorized to generate electricity, licensed under a specific access and remuneration regime, and which deliver such electricity to the transmission or to the distribution network.

Energy sector legislation applicable to the project is summarised below:

- Decree-Law No. 1/2011, January 3rd establishes provisions related to the promotion, incentive, access, licensing, and exploration inherent to independent production activity and self-production of electricity based on renewable energy sources.
- Decree-Law 54/1999, of August 30th, establishing the basic law for the Electric System of Cabo Verde, modified by Decree 14/2006, of February 20th and Decree-Law 4/2013, of January 29th.
- The Strategic Plan for Renewable Energies (*Plano Estratégico Sectorial das Energias*, PESER), approved by Resolution No.7/2012, is a sectoral policy instrument aiming at programming and concretizing the baselines related to the development of renewable energies (in Annex I), guaranteeing good use of territorial resources and taking into consideration the energetic efficiency and renewable energy use. PESER also specifies several Development Areas (in Annex II) for Renewable Energy Production (ZDER).
- The Master Plan of the Electricity Sector for 2018-2040 (*Plano Director do Sector Eléctrico 2018-2040*), approved by Resolution 39/2019, of April 8th ("PDSE"), which establishes several goals for the electricity sector in Cabo Verde such as the levels of energy generated from renewable resources.
- The National Program for Sustainable Energy (NPSE), which was launched within the framework of the country's Strategic Plan for Sustainable Development (2017-2021). It is clear that Cabo Verde's government intends to meet certain goals of generation of energy from renewable resources in order to promote energy efficiency, sustainability, and the reduction of energy consumption costs, recognizing that such goals can only be achieved using energy storage solutions.

Finally, the following territorial management instruments (ITG, *Instrumentos de Gestão Territorial* in Portuguese) and legislation have been considered:

- Legislative Decree 1/2006 of February 13th and its amendment Decree-Law No. 18/2016, which approve the foundations for territorial ordering and urban zoning.
- Legislative Decree 21/2007 of July 19th and its amendment Decree-Law No. 3/2015, which establishes principles and norms for land use by public and private entities.
- National Spatial Planning Directive (*Directiva Nacional do Ordenamento do Território*) (DNOT), approved by the Law No. 28/VIII/2013, of April 10th.

- Regional Spatial Planning Scheme (*Esquema Regional de Ordenamento do Território*) for São Vicente Island, established through the Resolution No. 20/2011, of May 24th and Resolution no. 4/2014 of January 8th.
- São Vicente Municipal Master Plan (*Plano Director Municipal de São Vicente*) (PDM), ratified by the Resolution No. 532/2019, of 20th August.

2.2 International Agreements

The main conventions ratified by the country related to the environment should be considered, namely those concerning desertification, climate change, biodiversity, protection of the ozone layer, exploitation of halieutic resources, hydrocarbon pollution, and persistent organic pollutants, among others.

Cabo Verde is party to numerous regional and international conventions and protocols regarding to the environment and society, such as those listed in Table 2-1 and Table 2-2, respectively (non-exhaustive).

Table 2-1 International environmental agreements signed by Cabo Verde

Treaty	Signature	Cabo Verde Ratification
Basel Convention on the Control of Transboundary movements of hazardous waste and other waste	1989	1999
Cartagena Protocol on Biosafety	2000	2005
Convention on Biological Diversity (CBD)	1992	1995
Convention on International Trade in Endangered Species of wild fauna and flora (CITES)	2005	2005
Convention on Migratory Species (CMS)	2006	2006
International Commission for the Conservation of Atlantic Tunas	1966	1979
Kyoto Protocol on the reduction of GHG	1997	2006
Montreal Protocol on substances that deplete the ozone layer	1987	2001
Paris Agreement about climate change	2016	2017
Ramsar Convention about wetlands	2005	2005
Framework Convention on Climate Change (UNFCCC)	1994	1995
Rotterdam Convention about hazardous chemicals	2004	2006
Stockholm Convention on Persistent Organic Pollutants	2001	2006
UN Convention on the Law of the Sea	1982	1987
UN Convention to Combat Desertification (UNCCD)	1994	1995
Vienna Convention for the protection of the ozone layer	1985	2001

https://www.informea.org/en/countries/cv/party-contacts-hub

Table 2-2 International social agreements signed by Cabo Verde

Treaty	Signature	Cabo Verde Ratification
Convention against Torture and Other Cruel Inhuman or Degrading Treatment or Punishment	2011	1992 / 2016
International Covenant on Civil and Political Rights	1966	1993 / 2000
Convention for the Protection of All Persons from Enforced Disappearance	2007	2022
Convention on the Elimination of All Forms of Discrimination against Women	1979	1980
International Convention on the Elimination of All Forms of Racial Discrimination	1969	1979
International Covenant on Economic, Social and Cultural Rights	1976	1993
International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families	-	1997
Convention on the Rights of the Child	1989	1992
Convention on the Rights of Persons with Disabilities	2007	2011
African Charter on the Rights and Welfare of the Child	1990	1992
African Charter on Human and People's Rights	1986	1987
Convention concerning Discrimination in Respect of Employment and Occupation	1958	1979

https://tbinternet.ohchr.org/_layouts/15/TreatyBodyExternal/Treaty.aspx?CountryID=32&Lang=EN

2.3 International Financing Standards

Cabeolica endeavour to comply with Cabo Verde legislation and International Agreements, and to meet Lenders' requirements of the European Investment Bank (EIB) Environmental and Social Standards (2022) and the African Development Bank (AfDB) Operational Safeguards (2023).

2.3.1 European Investment Bank (EIB)

The European Investment Bank (EIB) is the financing institution of the European Union; therefore, all projects selected by the EIB must be acceptable to, and consistent with, EU environmental policies and law. The purpose of the EU environmental assessment procedure is to determine the potential environmental and social impacts of a project and to plan the proportionate avoidance and mitigation measures to be incorporated into the design, implementation, and operation of a project. The eleven (11) standards specified by the EIB document "Environmental and Social Standards," February 2022, are listed in Table 2-3.

Table 2-3 EIB Environmental and Social Standards

EIB STANDARDS ON ENVIRONMENT AND SOCIETY		
No.	**Standard**	**Objectives**
1	Environmental & Social Impacts / Risks	Promotes an integrated approach to impact assessment and risk management by ensuring that environmental, climate, social and human rights considerations are addressed and taken into account in the decision-making processes.
2	Stakeholder Engagement	Recognises the importance of stakeholder engagement as a means to ensure respect for rights to i) access to information, ii) public participation in decision-making processes, and iii) access to justice.
3	Resource Efficiency and Pollution Prevention	Encourages identification, design and use of appropriate technologies, processes, and services to achieve environmental quality objectives, including the use of Best Available Techniques (BAT) or emerging techniques, as relevant. Promotes the transition to a circular economy through the development and use of existing and/or new business models that seek to increase circularity (maintaining the value of products, materials, and other resources as long as possible), which can deliver substantial material savings throughout the value chain and production processes, generate extra value, and unlock economic opportunities.
4	Biodiversity and Ecosystems	Responsibilities for the identification, assessment, management, and monitoring of impacts and risks that affect biodiversity and ecosystems resulting from projects financed by the EIB, ensuring consistency with the "Do no significant harm" principle.
5	Climate Change	Recognises the importance and urgency of combating climate change, which poses a major global threat and is a common concern for humankind, as rising temperatures increasingly result in severe, pervasive, and irreversible negative impacts for people, economic activities, ecosystems, and regenerative capacity of the planet. Recognises the role of finance in supporting low-carbon and climate-resilient development to i) address climate change by reducing greenhouse gas (GHG) emissions, and ii) build the resilience and adaptive capacity of people, nature, and assets to cope with current and future climate change-induced impacts.
6	Involuntary Resettlement	Outlines the promoter's responsibilities to manage involuntary resettlement risks and impacts, i.e., displacement as a direct result of project-related land acquisition or restriction on land use. Where involuntary resettlement cannot be avoided, it should be minimised, and appropriate measures should be implemented to mitigate adverse impacts on rights-holders with a view to improving or at least restoring their socioeconomic and cultural conditions.
7	Vulnerable Groups, Indigenous Peoples and Gender	Outlines the responsibilities in terms of assessing, managing, and monitoring project impacts, risks, and opportunities related to Indigenous Peoples, as well as persons or groups that are vulnerable, marginalised, or discriminated against due to their socioeconomic characteristics. The overall objective of this Standard is to address inequalities, including those that are gender-based, and other factors contributing to vulnerability, marginalisation, and/or discrimination within the context of an EIB project, and to facilitate equitable access to effective mitigation and/or compensation measures as well as project benefits for project-affected individuals and groups.
8	Labour Rights	Specifies the requirements in alignment with the rights and principles of the Fundamental Conventions of the International Labour Organisation (ILO) and the European Pillar of Social Rights. The objective of this Standard is to set out minimum requirements that the project's policies and procedures shall address.
9	Health, Safety and Security	Outlines promoter's responsibilities to assess, manage, and monitor occupational and public health, safety and security risks associated with projects supported by the EIB, whilst acknowledging the role of relevant authorities in protecting and promoting the health and safety of workers and the public.
10	Cultural Heritage	Outlines promoter's responsibilities to identify, assess, manage, and monitor cultural heritage-related impacts and risks associated with the projects requesting EIB financing. The objective of this Standard is to set out requirements applicable to EIB-financed projects that the promoter shall comply with.
11	Intermediated Finance	Establishes how the environmental, climate, and social (ECS) impacts and risks arising from sub-projects shall be identified, assessed for their significance, managed, and monitored in line with applicable requirements and commensurate with the sub-project's size, nature, socioeconomic context, location, and sector sensitivity to ECS impacts and risks.

Standard 1 – Environmental and Social Impacts and Risks, indicates the following:

- Article 18: For projects listed in Annex II to the EIA Directive (Directive 2011/92/EU 13 December 2011), which include "Installations for the harnessing of wind power for energy production (windfarms)", and/or in the national legislation, the need for an environmental and/or social impact assessment is determined by a case-by-case examination and based on criteria specified in Annex 1a of this Standard.
- Article 19: In determining the need for an environmental and social impact assessment, the promoter collects and provides the EIB with the information specified in Annex 1b of this Standard. The information should be sufficiently comprehensive to provide the basis for the promoter's determination. The outcomes of the determination, including its justification, are communicated to the EIB and considered in its due diligence process.

Based on the interpretation and classification that the windfarm Expansion Project included in Annex II of the EIA Directive, i.e., all five components constituting a single windfarm project, it was agreed between Cabeolica and Worley that some form of proportionate Environmental Assessment should be performed.

2.3.2 African Development Bank (AfDB)

The Integrated Safeguards System – Policy Statement and Operational Safeguards (2023) of the AfDB is intended to assist borrowers to manage risks and impacts of a project or other activities or initiatives, and to improve environmental and social performance based on the results of a risk-based approach. The desired results, described in the objectives of each environmental and social operational safeguard (OS), are accompanied by specific requirements to assist borrowers to achieve these objectives through means that are appropriate to the nature and scale of the project, activity, or other initiatives, and proportionate to the level of environmental and social risks and impacts. Funding of the Expansion Project by the AfDB requires compliance with AfDB operational policies and procedures, which are summarised in Table 2-4.

Table 2-4 Summary of AfDB Operational Safeguards

AfDB Integrated Safeguards System	
Operational Safeguards	**Objectives**
OS 1: Assessment and management of environmental and social risk and impact	Mainstreams environmental and social considerations, including those related to climate change, and establishes Borrower responsibilities for assessing, managing, and monitoring E&S risks and impacts associated with each stage of an operation supported by AfDB. Together with OS10, provides an overall process framework for the ESA (Environmental and Social Assessment) and management of Bank-financed operations at the level of a project, activities, or other undertakings supported through Bank financing.
OS 2: Labour and working conditions	Addresses the importance of employment creation and income generation in pursuit of poverty reduction and inclusive economic growth. Respect of workers' rights is a keystone for developing a strong and productive workforce, informed by the ILO Declaration on the Fundamental Principles and Rights at Work and the United Nations Guiding Principles on Business and Human Rights.
OS 3: Resources efficiency and pollution prevention and management	As part of project preparation, the borrower shall evaluate the potential impacts of pollutant discharges and resulting ambient concentrations to the environment. Promotes the sustainable use of resources and the avoidance or minimization of adverse impacts on human health and the environment by avoiding and minimizing pollution from project activities, project-related emissions of short- and long-lived climate pollutants, and

AfDB Integrated Safeguards System	
	generation of hazardous and non-hazardous waste, and the minimization and management of the risks and impacts associated with pesticide use.
OS 4: Community health, safety, and security	Addresses health, safety and security risks to and impacts on project-affected communities and the corresponding Borrower responsibility to avoid or minimize them, with particular attention to people who, due to their particular circumstances, may be vulnerable.
OS 5: Land acquisition, restrictions on access to land and land use, and involuntary resettlement	Recognizing that project-related land acquisition, restrictions on land access or land use, and loss of property/assets can have adverse impacts on communities and persons, objectives include, among others, the avoidance of involuntary resettlement where feasible to ensure that resettlement plans and activities are informed by social assessments, including gender issues, to avoid forced eviction and to mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use.
OS 6: Habitat and biodiversity conservation, and sustainable management of living natural resources	Outlines Borrower requirements to identify and implement opportunities to conserve and sustainably use biodiversity and natural habitats and to observe, implement, and respond to requirements for the conservation and sustainable management of priority ecosystem services. Reflects the objectives of the Convention on Biological Diversity to conserve biological diversity and promote the sustainable management and use of natural resources.
OS 7: Vulnerable groups	Contributes to poverty reduction and sustainable development by ensuring that projects supported by the Bank enhance opportunities for vulnerable groups to participate in, and benefit from, the development process in ways that do not threaten their unique cultural identities and well-being. Recognizes that some cultural groups, due to their lifestyle, culture, and strong dependence on the natural environment, have identities and aspirations that are distinct from mainstream groups in national societies and are often disadvantaged by traditional models of development.
OS 8: Cultural heritage	Sets out general provisions on the risks to and impacts on cultural heritage from project activities, as well as additional requirements for cultural heritage in the context of vulnerable groups and HVRM, including indigenous peoples.
OS 9: Financial intermediaries	Addresses the environmental and social (E&S) requirements associated with intermediated financing through financial and non-financial institutions. Sets out how Financial Intermediates (FI) will assess and manage E&S risks and impacts associated with subprojects financed by FI and support the adoption of best practice standards in corporate governance, business management, and corporate responsibility by enterprises supported by the Bank based on the requirements of OS1 and OS10, as appropriate.
OS 10: Stakeholder engagement and information disclosure	Recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Objectives include establishing a systematic approach to stakeholder engagement that will help borrowers to identify stakeholder and build and maintain a constructive relationship and channels of communication with them and ensuring that appropriate project information of E&S risks and impacts is disclosed to stakeholders in a manner and format that are timely, understandable, accessible, and appropriate.

AfDB Integrated Safeguards Systems

Working with AfDB operations staff, the borrower or client screens the project for environmental and social impacts, including climate change impacts, potential adaptation and mitigation measures, and the vulnerability of populations and their livelihoods, to determine the specific type and level of environmental and social assessment.

AfDB OS1 defines the following three E&S categories:

- High Risk – Category 1 – High-risk operations likely to cause significant and/or irreversible adverse environmental and/or social impacts on a large scale, or to significantly affect environmental or

social components that the Bank or the borrowing country considers sensitive. This category includes projects classified as high risk under national legislation or moderate-risk projects financed by the Bank in a low E&S implementation capacity or fragile context.

- Moderate Risk – Category 2 – Moderate-risk operations likely to cause adverse E&S impacts that are lower than in Category 1 operations, medium-scale, easily reversible, and readily minimized by applying appropriate management and mitigation measures or incorporating internationally recognized design criteria and standards. These include projects classified as moderate risk under national legislation, or low-risk projects financed by the Bank in a lack of E&S implementation capacity or fragile context.
- Low Risk – Category 3 – Low-risk operations that do not directly or indirectly adversely affect the environment and that are unlikely to induce adverse social impacts. This category does not require a formal ESA although E&S mitigation or maximization measures may be included/recommended in the project design.

A Phase II Environmental & Social Identification Mission was conducted by the AfDB between 22-31 May 2024 for the Cabeolica Expansion Project, which consists of the five components:

- **Component 1:** Expansion of the Cabeolica Santiago windfarm with three (3) wind turbines to contribute a total net power capacity of about 13.5 MW.
- **Component 2:** Installation of a Battery Energy Storage System (BESS) of approximately 6 MW/ 6 MWh storage capacity to provide ancillary services at the Cabeolica Santiago windfarm.
- **Component 3:** Installation of a BESS of approximately 6 MW/6 MWh storage capacity to provide ancillary services at the Cabeolica Sal windfarm.
- **Component 4**: BESS of approximately 8 MW/8 MWh storage capacity for grid stability control and short-term storage at São Vicente Island, located close to ELECTRA Lazareto Power Station.
- **Component 5:** BESS of approximately 6 MW/6 MWh storage capacity for grid stability control and short-term storage at Boa Vista Island, located close to AEB Parcela Power Plant.

As a result of this mission, the Cabeolica Expansion Project was categorized by the AfDB as a **Category 2 – Moderate Risk Project**, which is required by the AfDB to produce an ESIA for each component.

On the advice of Advisian, the five components were divided into four ESIAs: one for Component 1 and 2 in Santiago, one for Component 3 in Sal, one for Component 4 and one for Component 5. Please refer to the other three ESIAs for components 1, 2, 3, and 5.

3 Project Description for Component 4

3.1 Project Location

The Cabeolica Expansion Project is in the Cabo Verde Archipelago. Component 4 is in the municipality of São Vicente, in the parish of Nossa Senhora da Luz, near the village of Lazareto in the northwest of the island, between Monte Cara and Porto Grande Bay of São Vicente Island in the Cabo Verde Archipelago. The site for Component 4, which is owned by Electra, is approximately 200 m from the ELECTRA Lazareto Power Station and approximately 3.7 km from the São Vicente windfarm. The plot details are summarized in Table 3-1, and the location is outlined in red in Figure 3-1.

Table 3-1 Summary information of the São Vicente Lazareto site

São Vicente BESS site characteristics	Details
Address / Location (island, country, municipality)	Parish of Nossa Senhora da Luz, São Vicente municipality
Geographic coordinates (WGS84 system)	Lat: 16.869548° / Long: -25.017101°
Plot identification number (NIP, *Número de Identificação Predial*)	0200417160000
Deployment area	BESS plot area: 27.8 x 24.9 (~692.22 m^2), with potential for expansion to ~735 m^2 Underground cable: 400 m length x 1 m trench width (400 m^2)
Ownership of lands for Project implementation	Electra S.A.
Current occupation of site	Idle

Figure 3-1 Location of Lazareto site

The nearest inhabited area is Lazareto approximately 300 m from the Lazareto site to the north, and the nearest environmental protected area is the Natural Park of Monte Verde, which is 8 km east of the site (see Figure 6-6 in Section 6.3.1).

The layout of the BESS and its locations are provided in Section 3.3.3. The delineation of the area of influence (AoI) of potential impacts (both direct and indirect) is presented in Section 6.1.

3.2 Justification and objectives

Cabo Verde has made significant progress towards achieving its energy access targets and increasing the use of renewable energy in the electricity mix, primarily for onshore wind and solar energy. In 2019, the total energy produced was 507 GWh, where 18.4% was generated using renewable energy sources (75.2MWh), and this percentage was increased in 2022 to 22% due to the installation of 27,2MW of wind turbines and 8MW of photovoltaic panels and energy battery storage systems. The government's energy goals included reaching a 30% share of renewable energy penetration by 2025, 50% by 2030 and 100% by 2040, following the Energy Sector Master Plan (2018-2040)[4].

[4] AfDB & Republic of Cabo Verde, Country Strategy Paper 2019-2024 Mid-Term review and country portfolio performance review, April 2024.

Cabo Verde's current energy policy is guided by the National Program for Sustainable Energy (NPSE), which was launched within the framework of the country's Strategic Plan for Sustainable Development (2017-2021), with the following five main axes of intervention:

1. Institutional strengthening and business environment reform
2. Organizational reform of the energy market structure
3. Strategic infrastructures investment
4. Renewable energies development
5. Promotion of energy efficiency

The NPSE objective is to support a secure, efficient, and sustainable energy sector, reducing the country's dependence on imported fossil fuels while ensuring universal access and safety.

To support the energy transition, Cabo Verde developed its first Smart Grid Roadmap (SGR) in 2019 with the support of the Government of the Grand Duchy of Luxembourg. The SGR aims to serve as the guiding paper for future grid modernization investments, leveraging the technological advances and best practices to continue to build an energy infrastructure that supports high levels of intermittent power generation, and ensures the efficiency of the energy system while allowing for new services (i.e., distributed generation, storage technology, electric mobility). It is understood that battery energy storage systems (BESS) can play a key role in building the required flexibility and resilience into the grid.

The Electricity Sector Master Plan (2017-2040) has established ambitious targets for renewable energy penetration of 30% by 2025 and exceed 50% by 2030. 10% of the mentioned targets is expected to be accounted for by Energy Storage, and the BESS to be installed in Sal, Santiago, São Vicente, and Boa Vista by Cabeolica are part of this Master Plan. The implementation of BESS systems can aid in achieving various objectives laid out in the Power Sector for Sustainable and Green Growth development purposes. These objectives include:

- Maximizing the use of renewable energy sources by consolidating variable renewable energy production with rapid response time,
- Balancing RE production to increase the energy share,
- Ensuring system stability and safety by controlling auxiliary services, frequency and reactive power, reducing operating costs and expanding the network by relieving network congestion,
- Integrating distributed energy resources by managing production variations and supply and demand management, and
- Improving the quality and supply by providing voltage control capabilities

On the island of São Vicente, most of the electricity is produced and distributed by Electra S.A., the largest public utility company in Cabo Verde. Electra operates two diesel thermal power plants on the island: the Matiota Power Plant and Lazareto Power Plant, with nominal power of 10.9 MW and 18.44 MW, respectively.

São Vicente is the island with the highest penetration rate of renewable energy in the country. In 2018 renewable energy accounted for almost 27% of the total electricity produced. Electra operates and owns a small 600KW wind farm (2x300 kW retrofitted turbines), and receives in average 21.5 GWh/year of wind energy from Cabeolica S.A.

Aside from efforts to increase investments in utility-scale renewable energy power plants in Cabo Verde, mainly from wind and solar resources, considerable effort is expended to promote distributed

generation systems across the country. By 2019, 4.4 MW of distributed generation systems were installed in the country (up from 1 MW in 2016), and 21% of the installations are in São Vicente.

Considering this information, the implementations of BESS in São Vicente and Boa Vista were identified as priority initiatives for the SGR (Smart Grid Roadmap, 2018), because they will contribute to achieving the following objectives defined in the Power Sector for SGR development purposes:

- Renewable energy maximization: capacity to consolidate renewable variable production (rapid response time) and energy balance of RE production (increase in energy share),
- System stability & safety: auxiliary services, frequency and reactive power control,
- Generation and reduction of operating costs: expansion of the network and deferral of investment by relieving network congestion.
- Distributed energy resources integration: to manage production variations connected to the distribution network by supply and demand management,
- Quality support: supply of voltage control capabilities.

3.3 Project Components and Auxiliary Developments

The main project components and auxiliary developments for **the Cabeolica Expansion Project in São Vicente Island (Component 4)** are described below.

3.3.1 Battery Energy Storage System (BESS)

When electricity production exceeds demand, the electricity is converted by a storage system into other forms of energy that can be stored and returned to the grid when demand is high or higher than production. Although energy storage systems cannot directly store the produced electricity, they contribute to decreasing the need to build additional energy generation capacity and respective associated facilities, such as transmission and distribution lines and related energy infrastructure.

A Battery Energy Storage System (BESS) comprises four major components: i) the battery (energy storage unit), ii) the power conversion system / inverter (interface between the Direct Current battery system and the AC power system), iii) the power plant controller (governs, monitors, and executes the intended functions of the energy storage application), and iv) transformers.

The battery system is an electrochemical device that provides electrical energy storage and discharge capability thanks to the chemical reactions that take place inside the battery cells. The cells, the basis units of the batteries, are connected in series to provide higher voltage and placed inside the battery modules. Battery racks include voltage and temperature sensors to monitor the cells stations and are arranged in racks and connected in series to increase the output voltage level of the battery system.

Battery racks also include a control and protection module, which typically includes fuses and contactors to prevent any damage to the equipment, and voltage and current sensors to provide measurements to the Battery Management System for monitoring the battery system operation within the set operational limits set.

Modular BESS are planned, each comprising several battery strings installed in containers (20'HQ containers) with their respective cooling system. For every two battery containers, a container with power converters, BESS SCADA, and switchgears will be implemented alongside outdoor LV/MV (Low Voltage / Medium Voltage) transformers.

A typical BESS is shown in a modular configuration in Figure 3-2.

Figure 3-2 Typical BESS configuration

The storage system destined for São Vicente Expansion Project comprises CEN Solutions and Lithium-Iron-Phosphate (LFP technology), which have better durability and safety features. CEN Solutions sources battery products from top-tier battery manufacturers with a proven track record of expertise and ISO qualified quality process, in-line with CEN Solutions requirements. The batteries installed in the battery containers are manufactured by NARADA.

The main technical characteristics of BESS system for São Vicente are listed in Table 3-2. External and internal illustrations of the battery container of the BESS are provided in Figure 3-3 and Figure 3-4, respectively.

Table 3-2 Preliminary pre-sized BESS technical characteristics

BESS Component	Capabilities
No. of installed BESS	1
Power Rating (MW)	8
Energy Capacity Rating (MWh)	8
Rate of discharge requirement	1C
Mode of operation	Spinning Reserve & ancillary services
Connection Voltage (kV)	20
Electrical connection	Underground MV cable of 400 m, connection to the existing Lazareto substation
Battery containers	(2x20'HQ) x 3 blocks
Dimensions (per rack) (mm)	1000 x 938 x 2130
Battery type	Narada Batteries 76.8NESP200 (1C): 3465 kWh installed capacity x 3 blocks = 10395 kWh
Auxiliary system	Direct current distribution panel and alternating current panel, BMS, HVAC, fire system
PCS	SMA model SCS 3600UP Rated apparent power (at 25ºC and 1200 V) 3620 kVA Control system (EMS-PPC) and HMI

Figure 3-3 External view of a battery container of a BESS

Figure 3-4 Internal view of a battery container of a BESS

The **Power Collector System (PCS)** modulates the energy from the BESS and connects it to the distribution grid, both to inject and absorb energy. The system is composed of the required components and electrical current insulation to connect the system to the Point of Connection of ELECTRA Lazareto Power Station, including:

- AC side electrical protections,
- AC / DC electronic power converter,
- DC-side electrical protections,
- Connection Busbars, and
- Control and energy management unit.

The BESS will be equipped with a **MV substation** manufactured by Siemens, which includes a switchgear, consisting of 20 kV circuit breakers for the BESS arrivals and a 20 kV circuit breaker acting as the Interconnection Point to the existing grid. The typical configuration for BESS facilities is the following:

- BESS circuit breakers

- Interconnection circuit breaker, with a voltage transformer for the measurement system in the point of reference (PoR)
- Switch disconnector with fuse protection for the auxiliary transformer
- A transformer for each circuit breaker and a voltage transformer for the measure system in the 20 kV busbar (as an addition)

The main characteristics of the switchgear are listed in Table 3-3.

Table 3-3 Main characteristics of the MV substation switchgear

Stichgear characteristics	Capabilities
Model	Siemens, 8DJH type
Installation	Outdoor
No. of phases	3
Rated voltage	24.0 kV
Operating voltage	20.0 kV
Rated frequency	50 Hz

Furthermore, the BESS will contain a dedicated set of **three transformers** (Type I power transformers) adjacent to the storage modules for the 20 kV connecting to step-up the voltage from the inverters output to the grid voltage level. Type I transformers are dry type and will be manufactured by BETA.

To complete the facility, a 30 m^2 **warehouse / maintenance building** will be installed at the BESS site to store spare parts and servicing equipment for the BESS. The warehouse will be enclosed, of concrete construction with masonry walls and insulated roof, and security protected and lock-enabled, and installed with an HVAC system for appropriate ventilation.

3.3.2 Electrical connection

The BESS will require the installation of a single 20 kV 3-phase underground circuit to the existing off-taker substation (approximately 400 m length), which will be installed in a trench adjacent to an existing cable, avoiding physical interferences between them. The site layout design and electrical connection are provided in Figure 3-5 and in the Single Line Diagram in Figure 3-6.

Figure 3-5 São Vicente Site Layout Design and Electrical Connections (black) and Substation (red)

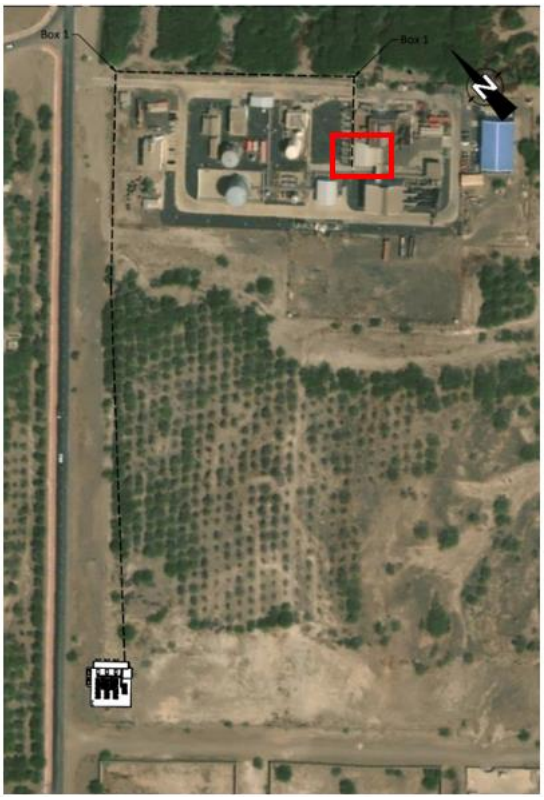
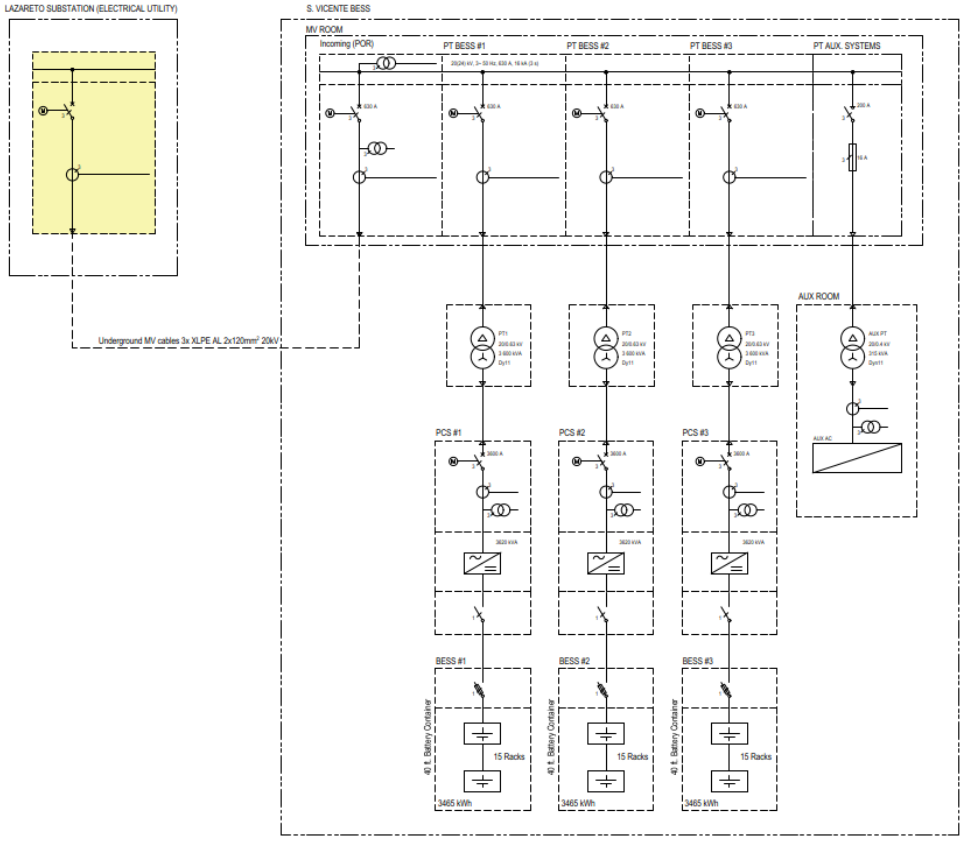


Figure 3-6 São Vicente Single Line Diagram



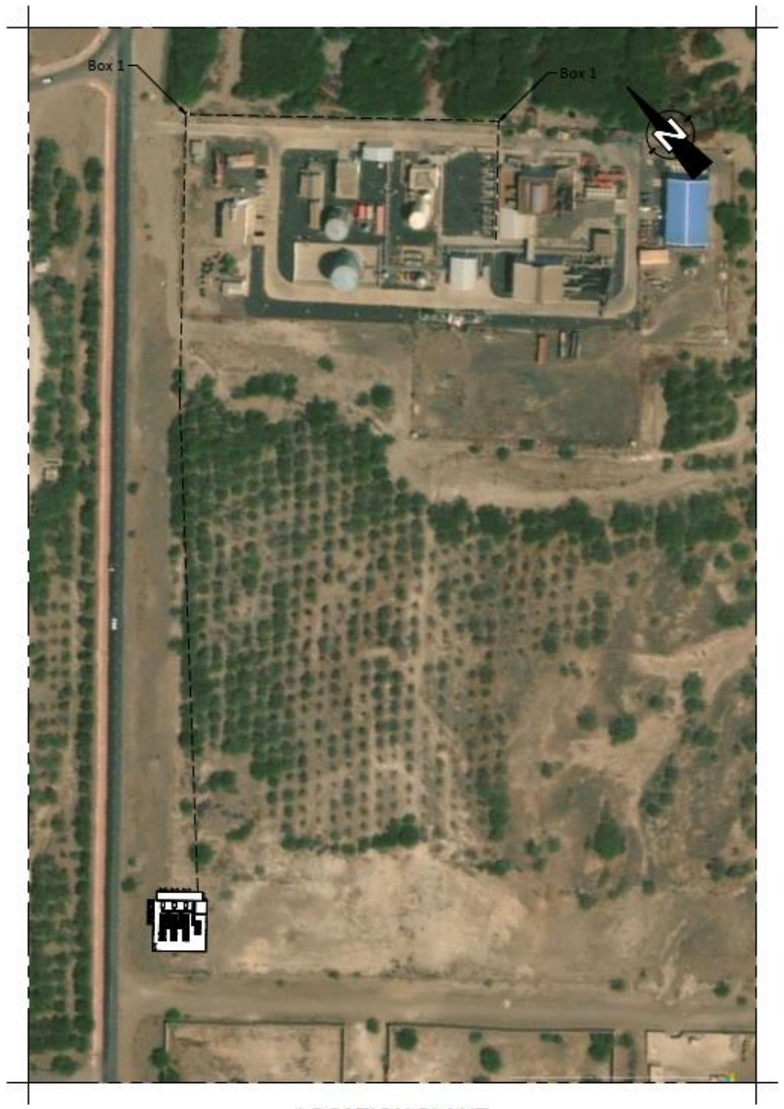
3.3.3 Site layout

The layout for the São Vicente BESS with three sets of two containers is shown in Figure 3-7, which includes the following components for the BESS facility:

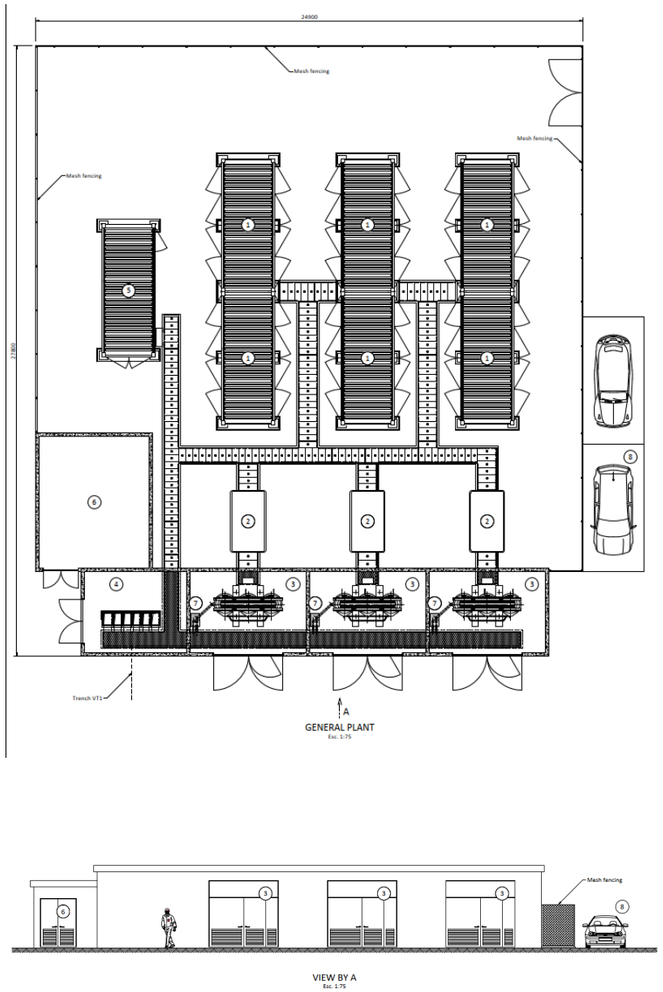
- 6 containerized battery modules
- 3 inverters (PCS)
- 3 step-up transformers
- 1 MV substation
- 1 LV room and Control house
- 1 warehouse of 30 m^2
- 3 temperature controllers
- 1 parking area with space for two vehicles.

The development of a site layout is an iterative process. As the project progresses to the detailed design stage followed by the construction stage, additional factors may become apparent, such as soil conditions or other constraints on the site. However, for the purposes of the Project description, it is Advisian's understanding that the physical footprint of the site will remain the same.

Figure 3-7 BESS layout on São Vicente Island



LOCATION PLANT
Esc. 1:2000



GENERAL PLANT
Esc. 1:75

VIEW BY A
Esc. 1:75

Part Nr.	Description	Qty.
1	Containerized Battery Module	6
2	Inverter (PCS)	3
3	Step-up Transformer	3
4	Medium Voltage Substation	1
5	Low Voltage Room and Control House	1
6	Warehouse (30m^2)	1
7	Temperature Controller	3
8	Parking	2

3.4 Project Phases

The key phases of the Cabeolica Expansion Project in São Vicente (Component 4) are described below: pre-construction (Section 3.4.1), construction (Section 3.4.2), commissioning, operation and maintenance (Section 3.4.3), and decommissioning (Section 3.4.4).

3.4.1 Pre-construction phase

During pre-construction, the site will undergo setup, mobilisation, and preliminary works. The activities to be undertaken under this phase will entail the following:

- Preparation of the detailed design and layout of BESS within the project site
- Procurement of all necessary equipment and materials for BESS construction
- Site mobilisation of personnel and equipment
- Delineation and preparation of temporary work areas: hazardous substances management area, materials storage area, waste management areas, car park, and offices
- Site preparation and earthwork design, for which a topographic survey of all designated work areas will be conducted.

The pre-assembled BESS will arrive at the São Vicente Port (Mindelo Porto Grande, 5 km northeast of the site) inside sea-going containers. The BESS equipment will then be loaded onto a truck and transported to the site, where the complete units will be moved using a forklift truck, thus avoiding the need for heavy-lifting cranes.

The BESS will then be installed on a suitably prepared platform and connected to the electrical substation.

Temporary work areas in São Vicente are expected to occupy 200-300 m^2 adjacent to the BESS footprint, or alternatively within the existing off-takers facility, within the NIP 0200417160000.

During pre-construction and construction, temporary fencing will be erected, as per the ESMP (see Section 8 and Appendix A), around the construction compound area, working areas, areas under restoration and, if necessary, areas identified as sensitive to disturbances to prevent inadvertent access of personnel or vehicles.

3.4.2 Construction phase

The key activities to take place during the construction phase are the BESS installation (Section 3.4.2.1), the electrical and mechanical works (Section 3.4.2.2), and the restoration of temporary work areas (Section 3.4.2.3).

3.4.2.1 BESS installation

Civil works for the BESS installation include the following tasks:

- Topsoil will be stripped throughout the area reserved for the BESS.
- Grading will be undertaken to direct offsite/onsite stormwater runoff around the BESS yard.
- Foundations will be built directly on isolated foundation beams with the depth determined by the nature of the terrain.
- Compacted fill material will be used for the platform of the BESS.
- A warehouse will be built within the BESS boundaries, to be constructed with concrete and masonry walls and an insulated roof.

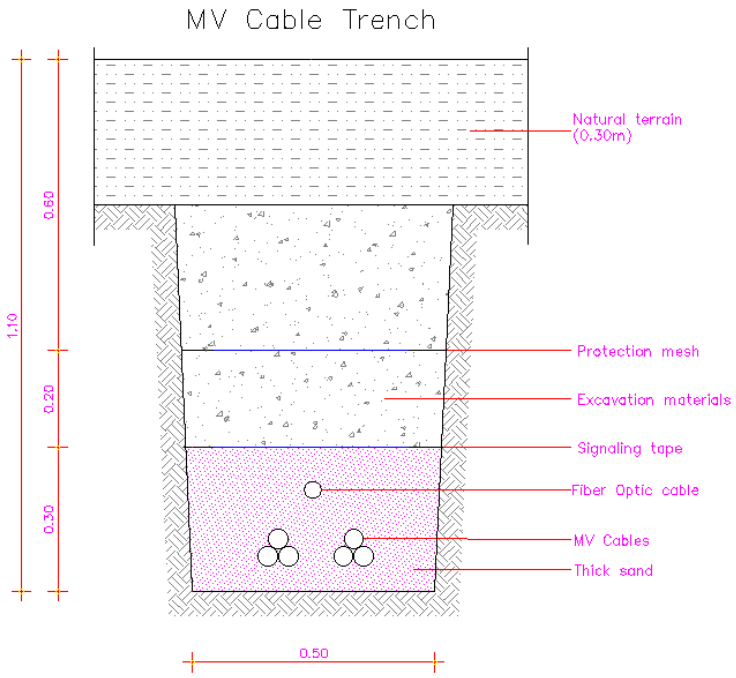
- A perimeter mesh fence will be installed around the BESS facility.

3.4.2.2 Electrical and mechanical works

These works include the installation of electrical infrastructure, e.g., underground cable laying, and installing transformers, switchgear, battery racks and modules, cooling/ventilation systems, and all other equipment and connections as required.
The provision of cabling and interconnections of BESS with the existing ELECTRA Power Station will include:

- Trenching and laying of 20kV 3-phase underground circuit to the existing substation. Trench dimensions are expected to be similar to the one shown in Figure 3-8.
- Backfilling and landscaping trenched areas.

Figure 3-8 Example of trench dimensions



3.4.2.3 Restoration of temporary work areas

After construction is complete, as per the ESMP, the temporary work areas will be restored to the extent as feasibility possible to their pre-construction conditions. All machinery and equipment will be removed from the site.

3.4.3 Commissioning, Operation and Maintenance

3.4.3.1 Commissioning and Performance Tests

Commissioning Tests of the BESS usually involve standard electrical tests for all the electrical infrastructure. Careful testing at this stage is vital if a good quality BESS is to be delivered and maintained.

Performance Tests shall be completed to determine whether the BESS are ready for energy storage. The site acceptance test for containerized BESS at project site will verify that the performance of the whole BESS system as well as individual component are functional and meet the requirement during the test. In addition to the standard tests of the system's electrical equipment, test for container, HVAC, FSS, energization, batteries, battery system performance or BMS shall be performed.

3.4.3.2 Operation and maintenance

The operation of the new components will involve the use of automatic and remote-controlled means, i.e., the permanent presence of operators will not be required.

BESS are essentially maintenance-free and require occasional on-site monitoring. The sole maintenance tasks to be carried out periodically are the monitoring and replacement of individual cells / modules and electrical checks when required.

During the operation phase, periodic maintenance by specialised personnel (BESS provider) will be carried out for the main equipment. It is expected to perform some quarterly maintenance by remote control, typically voltage inspections, SOC inspection, cables inspection, balancing etc. and typical yearly routine maintenance which includes the battery enclosure, power conversion system, transformer, battery units and fire suppression system. The preventative and corrective maintenance work will produce waste.

During the operation phase, mechanisms for the selective collection of waste and their subsequent transportation for recycling or elimination in installations licensed for that purpose shall be implemented by the BESS provider (see the Waste Management Plan (Doc. No. 06106-416041-47260-B-06-0029)). The periodicity of these interventions must be defined for this Project phase, given that the frequency and context of the maintenance operations will depend on the brands and models of the equipment to be acquired.

3.4.4 Decommissioning

The decommissioning process is summarised in Table 3-4.

Table 3-4 Summary of the decommissioning process

Decommissioning Phase	Procedure
Initial assessment and preparation	The assessment should cover the condition of the batteries, their capacity, and their remaining lifespan. It should also identify any hazardous materials that may be present, such as lead, lithium, or other heavy metals. This assessment will help determine the scope of work required and identify any potential hazards that need to be addressed.
Disconnection and isolation	Disconnect the BESS from the grid and any other electrical systems: This involves the safe disconnection of the BESS from any electrical connections or power sources. Isolate the BESS from any other equipment or structures in the vicinity: This may involve fencing off the area around the BESS or using barriers to prevent unauthorized access.
Battery removal	The BESS will be disconnected and dismantled as a single unit and kept on site.
Equipment removal	Remove all associated equipment: This includes inverters, transformers, and control systems that are associated with the BESS. The equipment should be carefully removed and transported to an appropriate recycling or disposal facility. Transport the equipment to an appropriate recycling or disposal facility: This may involve transporting the equipment to a specialized recycling or disposal facility, where it can be safely processed and disposed. The batteries are potentially a valuable source of recyclable metals.

The main components to be installed for decommissioning are listed below:

- Cranes: Cranes with a 100-tonne lifting capacity.
- Truck / Trailers: If components require transport and storage in a central storage area, trucks and trailers will be necessary.

The entire decommissioning procedure is estimated to take 6 months, beginning with the assessment of the state of the BESS and ending with the decommissioning process and site restoration.

3.5 Project Footprint

3.5.1 Physical presence

The maximum planned land area required for the São Vicente BESS installation is 735 m^2. The underground cable trench will occupy an area of 400 m^2 (400 m length x 1 m width).

3.5.2 Project Resources

3.5.2.1 Water

During pre-construction and construction activities, water will be used for consumption by the workforce and to produce concrete for BESS civil works. Regarding the latter, water will be supplied using trucks from local suppliers and stored onsite in tanks. The source and estimated volume of water for both phases are not available at this stage and will be confirmed by the EPC Contractor during the contract execution period. However, in order to assess the impact on the demand on water resources, estimates have been made in Section 7.1.2.1 for different uses of water during this phase. The construction phase water requirements area assessed as having a negligible impact on the local and São Vicente Island water resources and ecosystem services.

During the operation phase, there will be no water requirements for the operation of the BESS.

During the decommissioning phase, the water requirements will be similar to those for pre-construction and construction.

3.5.2.2 Raw Materials

During pre-construction and construction activities, cement, concrete, and raw materials (e.g., aggregate and fill) will be locally sourced from licensed quarries and transported to the site. The sources and estimates of raw materials are not available at this stage and will be confirmed by the EPC Contractor during the contract execution period. The construction phase construction materials requirements are assessed as having a negligible impact on the local and São Vicente Island natural resources and ecosystem services.

During the operation and decommissioning phases, raw materials will not be required for the new components of the BESS in São Vicente.

3.5.2.3 Fuel requirements and storage

The onsite fuel requirements during the pre-construction and constructions phase will be procured from local suppliers and transported to the site. Fuel will be stored in designated areas with secondary containment.

During operation, new components will require limited volumes of oil for maintenance activities. Oil will be stored in designated areas with secondary containment. Used oils will be collected and disposed of at approved waste treatment facilities or returned to the supplier for recycling, as per the WMP (Doc. No. 06106-416041-47260-B-06-0029).

During decommissioning, fuel requirements will be similar to those for pre-construction and construction and will be part of the decommissioning of the existing plants.

3.5.2.4 Power requirements

The power requirement during the pre-construction and construction phases will be met using onsite diesel generators of various sizes depending on the required usage.

During operation, additional power will not be required for the BESS, which will be placed next to power station and connected to the existing substation.

During decommissioning, power requirements will be similar to those for pre-construction and construction and will be part of the decommissioning of the existing power station.

3.5.3 Wastewater and Waste

3.5.3.1 Domestic wastewater and sewage

During construction, sanitary waste streams will be generated from domestic water use and from portable toilets. The wastewater will be appropriately collected in dedicated septic tanks, which will be emptied and serviced on a regular basis by an approved contractor.

The operation of the BESS will not generate wastewater streams.

During decommissioning, the production of domestic wastewater and sewage will be similar to that described for pre-construction and construction.

3.5.3.2 *Solid waste*

Solid waste, which will be generated during pre-construction and construction activities is likely to include limited quantities of construction waste (debris, discarded concrete, empty drums) and municipal solid waste (paper, cardboard, plastic and other packages, and food waste). Municipal waste will be collected in dedicated containers onsite and disposed of by an approved contractor at the local municipal landfill. Construction waste will be reused to the extent possible in construction activities or alternatively will be recycled, where practicable, or disposed of at a landfill, as per the WMP (Doc. No. 06106-416041-47260-B-06-0029).

During operation, the BESS operation and maintenance may generate small quantities of waste related to the maintenance of facilities (e.g., packaging waste, electrical components waste, and used oils or materials that come into contact with hazardous materials).

Significant quantities of solid waste will be generated during the decommissioning of BESS. BESS and their containers will be removed from the site and transported to approved facilities for reuse, recycling, or disposal. As per the WMP (Doc. No. 06106-416041-47260-B-06-0029), the transformers of the BESS will be removed from the containers and, with appropriate handling to prevent oil leaks, will be transported to a designated location for reprocessing where the oil will be removed from the transformers and sent for recycling or disposal at approved waste management facilities.

3.5.4 Air emissions

The generation of dust and particulate matter is expected during the pre-construction, construction, and decommissioning phases. Construction equipment will produce exhaust emissions from diesel engines, which will temporarily increase SO_2, NO_X, and CO_2 concentrations, and carbon monoxide (CO) will be released due to incomplete combustion of fuel in engines. As per the ESMP, all emissions will be within the appropriate limits and supplier specifications for normal operations.

Air pollutant emissions are not expected during the operation phase.

3.5.5 Noise

Sources of noise during pre-construction, construction, and decommissioning will be equipment and machinery. Typical maximum sound levels for the construction equipment to be used in the proposed construction activities are listed in Table 3-5 as A-weighted sound pressure levels (in decibels, dB(A)) based on the Defra[5] noise database for predicting noise on construction and open sites.

Table 3-5 Maximum sound pressure levels of construction and decommissioning equipment

Equipment/Machinery Type	Sound Pressure Level, L_{aeq} (dB(A))
Tracked excavator (loading dump truck)	85
Grader	86
Dump truck (tipping fill)	79

During operation, noise from electrical equipment and cooling technology of the BESS will emit noise to the surrounding environment, comparable to typical noise emissions of an electrical substation.

[5] Defra, Update of Noise Database for Prediction of noise on Construction and Open Sites, 2005

Battery Power Conversion Systems (PCS - Power Converters) emit a whine due to electrical switching, flow batteries pumps, and cooling fans.

The potential noise emission will depend on the chosen BESS technology (Li-ion batteries) and the means for cooling the batteries. Similarly, other ancillary systems (particularly transformers) can vary in noise output due to the cooling design adopted (natural or forced, air, oil, or water).

The sound power (L_W) represents the power of the noise output of a device, expressed in decibels (dB). The main sources of noise emissions from a BESS and example sound powers are the following:

- Transformers (as in other electrical installations): Beta Type I / II power transformers, which will be used in the Project, will emit sound power levels between 60 and 71 dB[6]
- Power Conversion System (inverters, as in PV power plants), e.g., SMA 3 MVA: 92.6 dB
- Fans and pumps of heat exchangers and chillers, e.g., Lenox LGH036 sufficient for one 40' battery container: 73 dB

These sounds coincide with operation at rated power and will decrease when the BESS is idle or at partial load. Furthermore, these sources of noise will be enclosed in metal or block buildings / enclosures, as detailed in the layout drawings provided in Section 3.3.3. As such, noise emissions impacts will be reduced to acceptable levels.

3.6 Project Schedule

The durations per phase are expected for the BESS project in São Vicente (Component 4) are listed in Table 3-6. These phases and timelines overlap, and the time schedule could require adjustment to market delivery conditions.

Table 3-6 Schedule of Cabeolica BESS Project in São Vicente

Project Phase	Expected Duration (months)
Pre-construction	≈ 3 months
Construction	≈ 9 months
Commissioning, Operation and Maintenance	
• Commissioning	≈ 1 month
• Operation and Maintenance	20 years
Decommissioning	≈ 6 months

3.7 Workforce and accommodation

The manpower required during pre-construction and construction phases of the São Vicente BESS (Component 4) will be limited and associated with transportation of the BESS components, the execution of civil works, and the mechanical and electrical works for the BESS. A more specialized workforce will be involved in connecting the BESS to the electrical system of the existing substation. In total, the workforce for this phase in São Vicente is estimated at a peak of 10 workers.

[6] BETA provider website: https://betaenerji.com/en/home/

Onsite accommodation is not anticipated. Due to the proximity, workers can be accommodated in nearby communities.

Where possible and practicable to do so, construction personnel will be sourced from the local area, and local contractors will be encouraged to tender for construction works packages. In support of this effort, Cabeolica will establish a register for interested companies and individuals to assist in the identification of supply and support opportunities during the construction of the new components.

During operation, new components will not require a workforce other than operators involved in occasional, planned maintenance activities that will be sourced by the BESS provider (estimated 5 indirect workers in São Vicente) during a period of 15 years (with the possibility of being extended to 20 years to cover all the battery life period).

4 Project Alternatives

4.1 Site Selection Alternatives

BESS technologies should be placed near selected distribution networks to provide enhanced frequency control of the network, reactive power support, and improved quality of supply performance.

During previous project phases, two potential sites that were preliminarily identified were evaluated for São Vicente BESS:

- Site 1- Lazareto Power Station
- Site 2- Matiota Substation

The Matiota Substation is in an industrial area in Mindelo, outlined in purple in Figure 4-1, with limited space available to install the BESS.

Figure 4-1 Location of Matiota Substation in Mindelo

The Lazareto power station acts as a distribution station and a potential platform for renewable energy integration due to existing connections to the Cabeolica São Vicente Windfarm and solar power stations on São Vicente Island. Therefore, the power station requires energy storage facilities to accommodate the influx of renewable energy required for network integration and store additional electrical energy required for peak arbitrage. Thus, the location of the BESS at the Lazareto substation will serve as a strategic storage point for several integrated substations and networks, including other current and future renewable projects.

As a result of the technical analysis, it was confirmed that the preferred site is Lazareto.

4.2 Technology Alternatives

Lithium-ion batteries were selected as the chosen energy storage technology option. Rather than a single electrochemical couple, like Nickel-Cadmium, Lithium-ion refers to a wide array of chemistries in which lithium ions are transferred between the electrodes during the charge and discharge reactions.

BESS sizing will be determined by the selected minimum Synchronous Generation (mSG) and Renewable Energy (RE) penetration limits, the vendor/manufacturer costs, and the Transmission System Operator (TSO) spinning reserve strategy. The calculated BESS sizing will be the optimal solution based on the current and planned generation and demand and will meet the Minimum Functional Specification (MFS) for preliminary 1C systems: 8 MW / 8 MWh.

4.3 No Project Alternative

The "no-go" alternative was assessed for this Simplified ESIA, which is to maintain the status quo and not embarking on the Project, i.e., to not install the BESS. If the Project were not to proceed, the potential changes to the receiving environment, whether their consequences are negative or positive, would not be realized and the inherent risks would be avoided. The inability of Cabeolica to undertake the proposed development would impact on the local and regional economic conditions because Cabo Verde would not be able to strengthen the electricity distribution network, integrate renewable energy, and reduce investment in conventional generation methods (i.e., coal-based power stations).

The Project, if implemented, will contribute to reduced reliance on fossil fuels and a smaller carbon footprint for electricity, which would not be realized if the no-go alternative is implemented.

5 Stakeholder Engagement

5.1 Introduction

Stakeholder Engagement, a key aspect of the ESIA process, is to ensure that project-affected stakeholders are informed, consulted and participate (ICP) in the design of the proposed Project, as well as enabling the gathering of local information about the project area, the identification of key issues, and the consideration of alternative approaches for achieving the Project objectives.

Stakeholder Engagement involves sharing information and knowledge, understanding the concerns of others, and relationship building, thereby allowing stakeholders to understand the risks, impacts and opportunities of the project to achieve positive outcomes. This process is an ongoing "two-way" process of information sharing between Cabeolica and stakeholders who may influence or be affected by the Project.

A Stakeholder Engagement Plan (SEP) for the Cabeolica Expansion Project was prepared following AfDB principles, EIB standards and Cabo Verdean legislation (Decree-Law No. 27/2020) to accomplish the following:

- Identify and analyze potential key stakeholders and consider their interests, impacts, and influences on the Project.
- Identify the most effective tools and methods to disseminate Project information and ensure regular, accessible, transparent, and appropriate consultation (e.g., a stakeholder register, engagement minutes, and attendance sheets).
- Inform relevant stakeholders of the Simplified ESIA and all aspects of the Project.
- Identify and highlight key environmental and social issues related to the Project.
- Ensure that all engagement activities meet requirements established by local and international standards for good practices.
- Provide a Grievance Redress Mechanism to be implemented during all phases of the project lifecycle.
- Provide monitoring and reporting systems to ensure effective and continuous engagement and follow-up during all phases of the project lifecycle.

The stakeholder engagement activities conducted within the framework of the Simplified ESIA and the key outcomes are described below. Additional details are available in the SEP provided in Appendix C.

5.2 ESIA Stakeholder Engagement Activities to-date and Key Outcomes

During the preparation of the Simplified ESIA, a consultation meeting was carried out in Hotel Don Paco at Mindelo, on August 1st, 2024, at 15:30 (local time).

The objectives of the meeting were the following:

- Introduce Cabeolica, the Project and its components to stakeholders and provide all available information about the Project.

- Provide an overview of the anticipated environmental and social impacts identified and assessed, and of the mitigation measures proposed to reduce their significance.
- Invite interested parties to participate in the Public Participation process, obtain a broad understanding of the proposed project, raise issues and concerns, and request / share information regarding the project.

As part of the effort to notify anyone interested in attending the meeting, the following communication channels were used to provide the public with 10 days of advance notice of the stakeholder meeting in Mindelo: a press notice in the form of a Scoping Notice in the major national daily newspaper, *Expresso das Ilhas,* and a notice posted in the Cabeolica Instagram profile.

Stakeholder with possible relevance to the BESS project were invited (e.g., project affected people and communities, national and local authorities and local NGOs). As the project is located in an industrial area, there are no nearby communities to be invited, and the meeting was attended by different stakeholders, most of whom were represented by companies and local NGOs, as listed in Table 5-1.

Table 5-1 Attendees to São Vicente stakeholder engagement meetings

ATTENDEES	
Stakeholder category	Attendees
Primary stakeholders - Project affected people / communities	Carlos Morais (Electra S.A.) Anilson Santana (Electra S.A.) Helder Barbosa (Electra / EDEC)
Secondary stakeholders – NGOs	Catelene Monteiro (Biosfera) Isabel Fortes Rodrigues (Biosfera) Aguinaldo David (Ass Amigos da Naturaleza)
Secondary stakeholders – Other stakeholders	Jansenio Delgaso (Electric Wind) Denise Helena Lopes Martins (ONSEC S.A.) Euricles Mariano (UNSEC S.A.)
Internal stakeholders	Vands Niel do Cruz Soares (Cabeolica São Vicente Windfarm - Vestas)

At the entrance of the meeting, leaflets that provide Project information and an "Invitation to comment" template were given to all participants.

The meeting was led by Telma Veiga, Cabeolica's MESA, who gave the presentation about Cabeolica, the Project, and the environmental and social impacts and mitigation measures. A local consultant, Pedro Ramos, and two Advisian consultants, Andrea Lázaro and Isabel Martínez, provided technical support during the meeting to Cabeolica via Teams.

After the presentation, participants were encouraged to ask questions, raise concerns and make suggestions about the Project. The issues raised and how they have been addressed in the Simplified ESIA are summarised in Table 5-2. Further details of specific issues raised and discussed during meetings are provided in Appendix C.

In summary, the main discussion topics were related to the expected methodology to be followed to manage waste (batteries and used oils), and other topics related with the fulfilment of applicable legal requirements. NGO representatives asked about confirming the necessity to hire a specialized team for tasks related to the relocation of fauna species during construction activities, and the concerns of an Electra representative were about the economic benefits of the project for the electricity consumer.

Suggestions for improvements to the Project were not made during this engagement.

Table 5-2 Stakeholder meetings outcomes, Project's answers and Simplified ESIA reference

Topic / Issue	Stakeholder concern	Project Response	Simplified ESIA reference
Environmental and Social Management Plan	The plan for monitoring the avifauna in the windfarm areas	Cabeolica response: Monitoring of avifauna in the windfarms is carried out according to the current ESMP, which only requires bird monitoring in BV as per national requirements.	No significant impacts for avifauna have been identified for the BESS project that would require monitoring either during construction or operation. Project specific information about fauna monitoring is referred to in *Section 8.2. Monitoring plan:* An initial site survey will be during once before pre-construction activities to identify areas of high concentration of fauna individuals (particularly reptiles) and flora. During construction activities, weekly verifications that areas used for construction activities are restricted to the areas delimited for this purpose will be done in the site construction area and access roads.
	Confirmation that a specialized team will be hired for the relocation of fauna species	Cabeolica confirmed that a specialized team will be hired to implement all mitigation and monitoring activities related to the relocation and preservation of sensitive species encountered in the Project area.	*Appendix A Environmental and Social Management Plan. Section 5.4.1. Institutional capacity, roles and responsibilities – Cabeolica E&S management* When required, Cabeolica engages specialist environmental and social support from appropriately qualified consultants.
Technical issues	The type of batteries to be installed	The specific type of batteries has not been defined at this point. That information will be shared when it becomes available. The batteries will be operated remotely.	*Section 3.3.1. Battery Energy Storage System (BESS) / Section 4.2. Technology alternatives* The EPC Contractor will be responsible for the final BESS configuration and shall propose a system that is considered the most suitable, robust, and reliable for spinning reserve operation at a competitive cost.
Waste Management	The methodology to be followed to dispose of battery waste at the end of the Project	Cabeolica response: The manufacturer will be responsible for disposing of the structural waste produced during project decommissioning.	*Section 7.1.4. Impacts during Decommissioning phase* *Impact on waste management infrastructure due to waste generation* Significant quantities of wastes are expected to be generated during the decommissioning phase. The Waste Management should be updated prior to starting this phase after identifying available and appropriate final disposal/recycling facilities. In general, the decommissioning should be accomplished according to the applicable regulations in force at the time of starting these activities.

Topic / Issue	Stakeholder concern	Project Response	Simplified ESIA reference
	The final destination of used oils from the transformers	Cabeolica response: large quantities of used oils are not expected. Oils will be recycled outside of the country.	*Section 3.4.3.2. Operation and maintenance* During operation, the BESS operation and maintenance may generate small quantities of waste related to the maintenance of facilities (e.g., packaging waste, used oils or materials that come into contact with hazardous materials). *Cabeolica Expansion Project_Waste Management Plan* (Doc. No. 06106-416041-47260-B-06-0029), *Section 4.4. Waste treatment, transportation and disposal – Cabeolica Exportation Program* Used oils and lubricants will be sent to oil reprocessing companies for recycling, if possible. Although several EU and UN initiatives and programmes are underway for reinforcing national waste management capacities, Cabo Verde does not yet have a comprehensive waste management sector or licensed facilities deploying GIIP for final disposal of hazardous wastes. As a result, Cabeolica has put in place the Cabeolica Exportation Program for those waste streams that cannot be managed in-country (e.g., WEEE and other hazardous waste).
Legal requirements	Confirmation that the project complies with all applicable legal requirements	The study fulfills national legislation as well as international requirements because the project lenders are the EIB and the AfDB.	*Section 2. Legal Framework – Section 2.3. International Financing Standards* Cabeolica endeavour to comply with Cabo Verde legislation and International Agreements, and to meet standards and procedures of the European Investment Bank (EIB) and the African Development Bank (AfDB), as described below.
	The Forestal Legislation is not referred in the Simplified ESIA.	Further investigation will be made regarding this legislation and, if applicable, it will be incorporated into the study.	Reference to this legislation was included in *Section 2.1 National legislation* and sectoral plans and considered in *Section 8.1.1. Mitigation measures for Routine Impacts* MiC16. Maintain the original condition of surface soils and vegetation cover to the extent practical during pre-construction and construction activities. Unnecessary removal of vegetation during construction should be avoided and surrounding vegetation must be protected by employing appropriate measures, such as fences and covers, etc. If applicable, an authorization for the removal of vegetation will be requested to *Direção Geral de Agricultura, Silvicultura e Pequária* (DGASP).

Topic / Issue	Stakeholder concern	Project Response	Simplified ESIA reference
Project initiative	The Project is a voluntary initiative or a government request	Cabeolica response: The project is the result of a bid launched by the Government, and thereby independent.	*Section 3.2. Justification and objectives* The Electricity Sector Master Plan (2017-2040) has established ambitious targets for renewable energy penetration of 30% by 2025 and exceed 50% by 2030. 10% of the mentioned targets is expected to be accounted for by Energy Storage, and the BESS to be installed in Sal, Santiago, São Vicente and Boa Vista by Cabeolica are part of this Master Plan.
Potential benefits	Economic benefits of the Project for the average electricity consumer	The Project will bring savings to the production of energy and environmental benefits to the country. The savings may not be immediate, but the average consumer will see the benefits of consuming renewable energy in the long-term.	*Section 3.2. Justification and objectives* The implementation of BESS systems can aid in achieving various objectives laid out in the Power Sector for Sustainable and Green Growth development purposes. These objectives include: • Maximizing the use of renewable energy sources by consolidating variable renewable energy production with rapid response time, • Balancing RE production to increase the energy share, • Ensuring system stability and safety by controlling auxiliary services, frequency and reactive power, reducing operating costs and expanding the network by relieving network congestion, • Integrating distributed energy resources by managing production variations and supply and demand management, and • Improving the quality and supply by providing voltage control capabilities.

6 Description of Baseline Environment

The Lazareto site for the new BESS is next to the ELECTRA Lazareto Power Station in the municipality of São Vicente, approximately 3.7 km from the São Vicente windfarm and approximately 300 m from the residential area of Lazareto, which is in the northwest of São Vicente Island, as shown in Figure 6-1.

Figure 6-1 São Vicente Island

The current environmental, socioeconomic, and cultural baseline is described below with an overview of the environmental and social aspects that relate to the surrounding areas of the Lazareto site that may be affected (directly or indirectly) by the proposed Cabeolica Expansion Project in São Vicente or that could impact on the proposed Project.

The purpose of this environmental baseline is to accomplish the following:

- Provide a description of the project area in São Vicente site and its surroundings.
- Identify and document existing environmental and socioeconomic conditions to establish baseline levels.
- Identify endemic, rare, and endangered species, as well as habitats and organisms, that may be sensitive to project activities.

The main environmental descriptors, listed in Table 6-1, were used to analyse the affected environment, based on information provided in the previous ESIA, *Implementation of Battery Energy Storage Systems projects, São Vicente and Boa Vista islands*, prepared by FUTURE Proman, S.A in 2021 with a site visit in August 2021.

Table 6-1 Environmental descriptors for baseline assessment

Environmental Descriptor	Environmental Components
Physical Environment	Climate
	Topography
	Hydrology and groundwater
	Geology and soil
	Air quality
	Noise
Biological Environment	Protected areas
	Flora and vegetation
	Fauna
Socioeconomic and Cultural	Population
	Health
	Economy
	Education
	Infrastructure
	Land use
	Landscape
	Cultural heritage

Additional information regarding in-Country Diagnosis in terms of environmental, social and climate change issues is provided in Appendix B. This appendix also presents country context-related information relevant to specific social-related risks at project level, such as human rights, gender profile, gender-based conflicts and labour conditions.

6.1 Delineation of the Area of Influence

The geographical boundaries of the area of influence (both direct and indirect) for the Cabeolica Expansion Project in São Vicente (Component 4) are described below for the physical, biological, and socioeconomic and cultural environments.

The **Direct Area of Influence (DAOI)** is defined by the spatial extent of the footprint created by the São Vicente BESS and associated facilities and their direct effects on the physical, biological, and socioeconomic environments, which include the following:

- Physical environment:
  - Topography, geology, and soils: The DAOI coincides with the entire plot of the BESS site and the 400 m electrical connection corridor to Electra's substation.
  - Air quality: The DAOI includes the entire plot of the BESS site and electrical connection corridor plus a 1-km wide buffer.
  - Noise: The DAOI includes the entire plot of the BESS site and electrical connection corridor plus a 500-m wide buffer.
- Biological environment:

The DAOI includes the entire plot of the BESS and a 200-m wide buffer zone around the project site (BESS site and electrical connection corridor). The sensitivities of different fauna groups to the project activities will vary, but the perimeter of the 200-m wide buffer zone is considered sufficient for the purposes of this study given that the site is located within an industrial area.

- Socioeconomic and cultural environment:

  Access roads approaching the project site and the nearest community, Lazareto residential area in the municipality of São Vicente, is approximately 300 m north from the BESS site, and nearby industrial areas.

The DAOI for each of the main components (physical, biological and socioeconomic) is shown in Figure 6-2

The **Indirect Area of Influence (IAOI)** is the wider area of influence where indirect, combined, and cumulative effects are likely to occur on the surrounding areas and communities, which include the following:

- São Vicente Island is the IAOI for impacts on the local economy.
- Roads leading from the delivery Port (an approximately 5 km route), which are bitumen-sealed and support heavy vehicular traffic, are within the IAOI.

Figure 6-2 Direct Area of Influence (DAOI) of the Project components in São Vicente site

6.2 Physical Environment

6.2.1 Climate

The irregular topography, high altitudes, and regular exposure to wind gusts affect the climate of São Vicente Island. These climatic conditions are pronounced across the island, which result in climatic variability from very dry to sub-humid.

The island has a dry tropical climate with trade winds from November to July and irregular rainfall during the rest of the year.

Temperature and precipitation data recorded at the Mindelo meteorological station on São Vicente Island, for the period 2010-2016, and made available by the National Institute of Meteorology and Geophysics are summarized in Table 6-2.

Table 6-2 Data from the Meteorological station of Mindelo

Indicator	2010	2011	2012	2013	2014	2015	2016
Average annual temperature	25.1	24.7	24.0	24.4	23.8	23.9	24.4
Total annual precipitation	302.0	259.9	150.8	224.8	78.9	73.6	233.6

"Estatísticas do Ambiente 2016", INE, Cabo Verde

The average annual temperature over this seven-year period was 24.8ºC, and the average annual precipitation was 189 mm.

The prevailing winds blew from the northeast, reaching average speeds of 20 km/h, and north-easterly winds dominated between November and May.

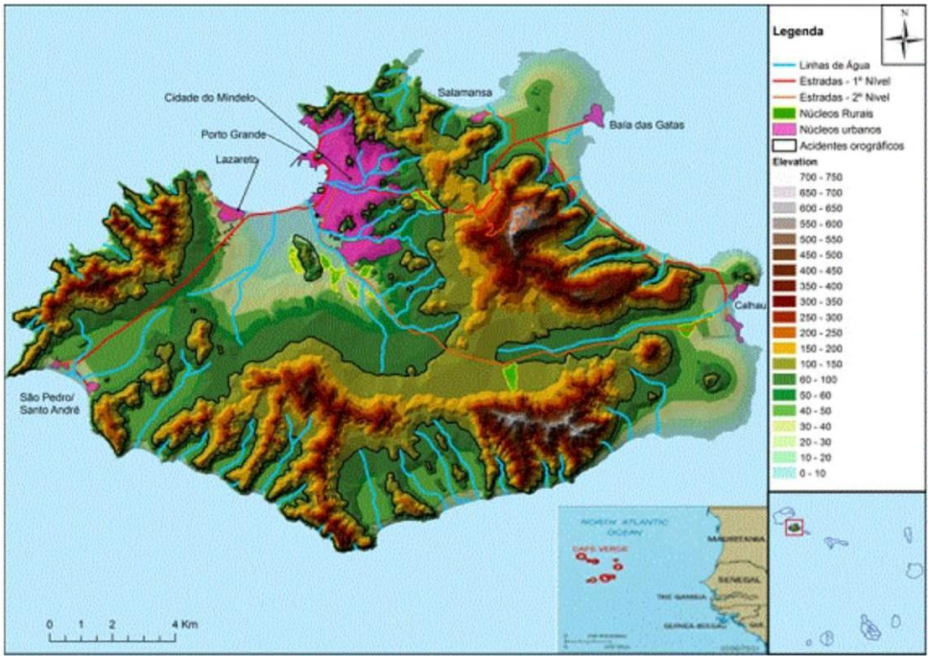
6.2.2 Topography

The Island of São Vicente is 29.5 km from the Ponta do Machado to the Ponta do Calhau, from West to East, and 16.5 km from the Ponta Joao Évora to the Ponta da Calheta Grande, from North to South. The outer parameter of the island is ringed by shifting slopes with a large central area of low-level terrain. The Lazareto site is on a plateau with a minor slope (0-10%).

6.2.3 Hydrology and groundwater

The existing rainfall drainage patterns (rivers, small waterways) of São Vicente Island are shown in Figure 6-3. Given the markedly seasonal nature of rainfall, these waterways carry runoff for only short periods. Riverbeds and storm water channels are typically dry.

Figure 6-3 São Vicente Island water lines



ESIA for the Implementation of BESS projects, São Vicente and Boa Vista islands, 2021

The pressure on surface water resources on São Vicente Island is assumed to be due to water pollution from the discharge of untreated or insufficiently treated wastewater, the inflow of contaminated rainwater, the use of fertilisers and pesticides in rural areas, the dispersion of unregulated rubbish dumps, the increasing urbanisation of rural areas without adequate wastewater and solid waste management solutions, and the proliferation of clandestine housing.

Like most islands in Cabo Verde, São Vicente Island does not have sufficient groundwater to cover existing needs. Furthermore, saline intrusion into the groundwater is a growing problem for water quality. In coastal areas, the problem of saline intrusion is a direct result of the over-exploitation and sand extraction on beaches, which destroys the natural barriers against saline intrusion.

There is no evidence of surface water bodies nor groundwater abstraction in Lazareto site. This situation was confirmed during fieldwork carried out in August 2021 for the previous ESIA prepared in 2021.

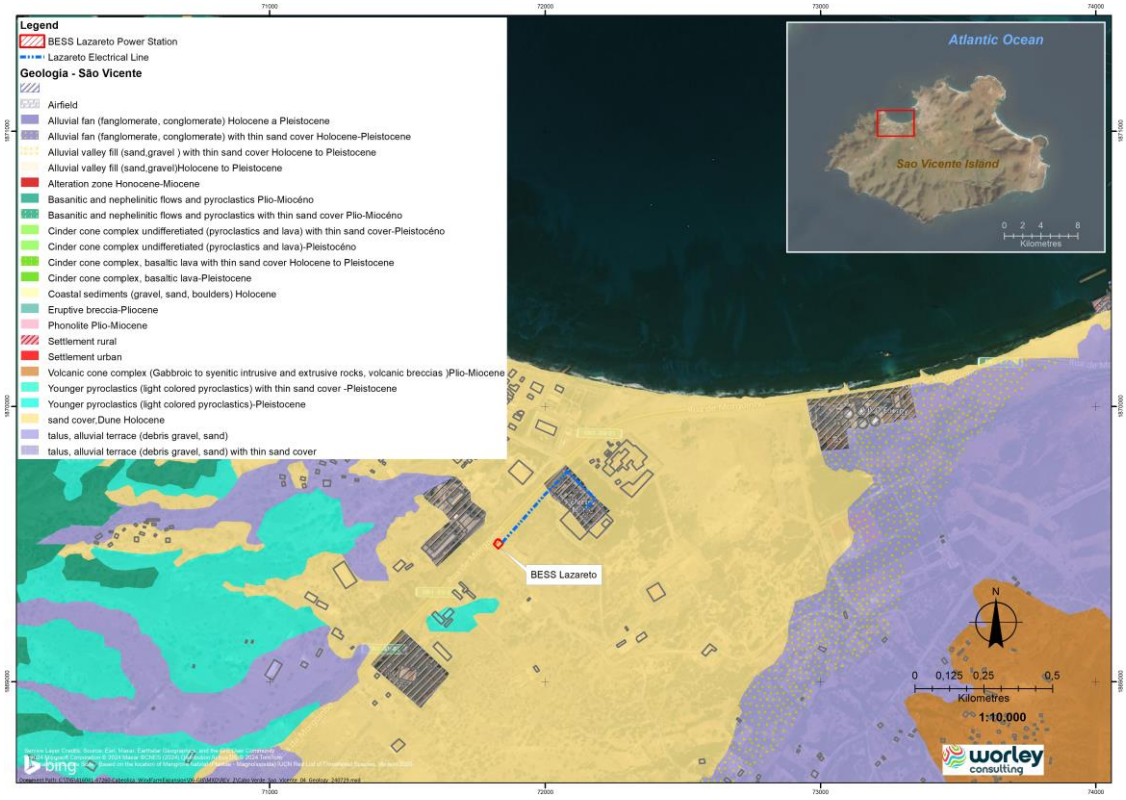
6.2.4 Geology and soils

The Cabo Verde islands are of volcanic origin and formed from the accumulation of eruptive material on the marine platform between the African coast and the great oceanic depths.

Cartography of the geological formation of the island of São Vicente shows soils of sedimentary origin, namely, limestone, sandstones and sparse sands that are stored in some coastal zones of the island, as is the case of the low coast of the Porto Grande Bay.

According to information made available on the National Institute for Land Management (*Instituto Nacional de Gestão do Território, INGT)* website, the Lazareto site falls within an area of Holocene dune - sand cover, as shown in Figure 6-4.

Figure 6-4 São Vicente study area – Geological map



The surface lithological materials that most directly influence the pedogenesis and evolution of the soils are essentially of eruptive origin. In general terms, São Vicente Island is characterized by the existence of the following pedological units:

- Leptosols (basaltic rocks, of eruptive breccia, of calcitic rocks, of granular rocks, calcareous rocks and phonolitic rocks).
- Arenosols (limestone sands).
- Cambisols (granular rocks, basaltic rocks, phonolitic rocks, eruptive breccias, volcanic tuffs, and slope deposits).

In particular, the Lazareto site and its immediate surroundings are mostly in an area of dunes and marginally in a very arid pasture area, according to the Agricultural Aptitude chart, available on the National Institute for Land Management (*Instituto Nacional de Gestão do Território*) website.

6.2.5 Air quality

The air quality is generally considered good on São Vicente Island, given the absence of relevant pollution sources and the strong influence of winds. As on other islands, a dry haze covers the entire island with suspended microscopic particles from December to March.

Specific information on the air quality in the study area is unavailable. Several industries and shipyards are identified in the surroundings area of the site (within 250 m), such as the Electra Lazareto Power Station, a civil construction site, a carpentry workshop, a transportation company (Polaris), a detergent production company (Químicas Cintila Lda), a fish canning and fish feed production factory (large), and

other factories. Views of two of the companies, Polaris and Cintila, are shown in Figure 6-5. The paved road that connects the San Pedro airport with Mindelo is approximately 10 m west of the site, and an unpaved access road is approximately 10 m south. The former is a source of vehicle emissions and the latter of dust particles from the passage of vehicles.

Figure 6-5 Polaris (transportation company, left) and Químicas Cintila (detergent production company, right) in the project surroundings

ESIA for the Implementation of BESS projects, São Vicente and Boa Vista islands, 2021

6.2.6 Noise

Monitoring data of the background noise levels in the project area are unavailable. Consequently, the characterisation of this variable is based on evidence found onsite during the ESIA fieldwork conducted in August 2021. The main source of noise in the area of influence of the Lazareto site is traffic on the Airport-Mindelo Road, which is not frequent except during periods of entry and exit of the industrial facilities in the area.

Sensitive receptors (i.e., residential areas) were not identified within 200 m of the site. Lazareto residential area is approximately 300 m from the Lazareto site to the north.

6.3 Biological Environment

As mentioned previously in Section 6, the description of the biological environment is based on information taken from the previous ESIA, *Implementation of Battery Energy Storage Systems projects, São Vicente and Boa Vista islands*, which was prepared by FUTURE Proman, S.A in 2021 with a site visit in August 2021. A further survey for the biological environment was not deemed necessary given the information provided by the 2021 study is recent (within the last 3 years) and valid for the site location and the limited scale of any potential impacts.

6.3.1 Protected areas

Designated protected areas, according to Law-Decree nº 3 / 2003 24 February, are not located within the area of influence of the BESS site. The closest environmental protected area is the Natural Park of Monte Verde, shaded in green in Figure 6-6, is 8 km east of the Lazareto site.

Monte Verde Natural Park is considered to be the only sub-humid area on the island. The altitude, 450 to 750 m, and its northeast sloops allow for frequent rain, and a total of 21 endemic species have been identified to date in the Natural Park.

Figure 6-6 Protected area of Natural Park of Monte Verde

6.3.2 Flora and vegetation

The Lazareto site is close to built-up and disturbed areas, such as roads and shipyards. The vegetation onsite is sparse, such as mature individuals of Acácia americana (*Prosopis juliflora*)[7], shown in Figure 6-7 with a coverage of 90% of the area[8].

The flora encountered in the area are listed in Table 6-3. Invasive species, such as *Nicotiana glauca* (Charuteira) and *Datura stramonium*, are also present, as shown in Figure 6-8. Shrub and herbaceous strata have generally low coverage.

[7] According to the 2021 ESIA, this species was *Acacia albida*. However, according to updated information from two local environmental experts (Pedro Ramos, Coordinator of this Study, and Aguinaldo David, from NGO Amigos da Naturaleza), this species is confirmed as Acácia americana (*Prosopis juliflora*).

[8] The 2021 ESIA also identified shrubs of *Sideroxylon marginata* species, which is an endemic species and is classified as Endangered by IUCN. After a site visit carried out by ONG Biosfera 1 in August 2024, it was confirmed that this species was not encountered on the site.

Table 6-3 Flora encountered during 2021 ESIA Site visit

Order	Family	Name	IUCN Conservation Status 2024	Endemism
Fabales	Fabaceae	Acácia americana – *Prosopis juliflora*	LC	I
Solanales	Solanaceae	*Nicotiana glauca* (Charuteira)	-	I
Solanales	Solanaceae	*Datura stramonium*	-	I

IUCN Conservation status (IUCN, 2024): LC – Least concern, EN – Endangered; E – Endemic, N – Native; and I – Introduced

Figure 6-7 Acácia americana (Prosopis juliflora) species in project area

ESIA for the Implementation of BESS projects, São Vicente and Boa Vista islands, Future Proman, 2021

Figure 6-8 Invasive species of Nicotiana glauca (left) and Datura stramonium (right)

ESIA for the Implementation of BESS projects, São Vicente and Boa Vista islands, Future Proman, 2021

6.3.3 Fauna

Avifauna

The avifauna community is the most diverse group on São Vicente Island, with 28 species, of which two are endemic to the archipelago: Cabo Verde Swift (*Apus alexandri*) and Cabo Verde sparrow (*Passer iagoensis*).

During the site visit carried out for the 2021 ESIA[9], the presence of the Cabo Verde sparrow (*Passer iagoensis*) and the Spectacled warbler (*Curruca conspicillata*)[10] was confirmed.

Cabo Verde sparrow (*Passer iagoensis*) is endemic to Cabo Verde and classified as Least Concern by the IUCN, and Spectacled warbler (*Sylvia conspicillata)* is also classified as Least Concern by the IUCN, but not endemic, However, the Lazareto BESS site does not support or contain habitat conducive to nesting or feeding for these species.

Table 6-4 Avifauna species (species observed during the 2021 ESIA Site Visit highlighted in bold)

Family	Scientific name	Common name	IUCN Conservation Status 2024	Endemism	Occurrence
Pandionidae	*Pandion haliaetus*	Osprey	LC	-	P
Accipitriformes	*Milvus milvus*	Red Kite	LC	-	P
Accipitriformes	*Milvus migrans*	Milhafre-preto	LC	-	P
Apodidae	*Apus alexandri*	Andorinhão de Cabo Verde	LC	E	P
Ardeidae	*Ardea cinerea*	Grey Heron	LC	-	P
Ardeidae	*Bubulcus ibis*	Cattle Egret or Garça boeira	LC	-	P
Ardeidae	*Egretta garzetta*	Little Egret	LC	-	P
Charadriidae	*Charadrius alexandrinus*	Kentish Plover	LC	-	P
Charadriidae	*Charadrius hiaticula*	Common Ringed Plover	LC	-	P
Corvidae	*Corvus ruficollis*	Crow or Corvo do deserto	LC	-	P
Falconidae	*Falco tinnunculus*	Kestrel (Falcão)	LC	-	P
Glareolidae	*Cursorius cursor*	Corredeira	LC	-	P
Laridae	*Larus fuscus*	Lesser Black-backed Gull	LC	-	P
Laridae	*Larus ridibundus*	Black-headed Gull	LC	-	P
Passeridae	*Passer hispaniolensis*	Tchota coco or Pardal	LC	-	P
Passeridae	***Passer iagoensis***	**Cabo Verde sparrow or Pardal de terra**	**LC**	**E**	**C**
Phasianidae	*Coturnix coturnix*	Codorniz	LC	-	P
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	LC	-	P
Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	LC	-	P
Scolopacidae	*Calidris alba*	Sanderling	LC	-	P
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	NT	-	P
Scolopacidae	*Calidris minuta*	Little Stint	LC	-	P
Scolopacidae	*Calidris minutilla*	Least Sandpiper	LC	-	P
Scolopacidae	*Numenius phaeopus*	Whimbrel	LC	-	P
Scolopacidae	*Phalaropus fulicarius*	Red Phalarope	LC	-	P
Scolopacidae	*Tringa nebularia*	Common Greenshank	LC	-	P
Silviidae	***Curruca conspicillata***	**Spectacled Warbler**	**LC**	**-**	**C**

[9] ESIA_Implementation of BESS projects, São Vicente and Boa Vista islands, Future Proman, 2021.
[10] The 2021 ESIA confirmed the presence of *Sylvia conspicillata orbitalis*, which is an endemic to Cabo Verde. However, the ONG Biosfera 1 confirmed that the subspecies *orbitalis* does not reproduce in the island and was probably mistaken with *Sylvia conspicillata or Curruca conspicillata* which is not endemic to Cabo Verde.

Family	Scientific name	Common name	IUCN Conservation Status 2024	Endemism	Occurrence
Sylviidae	*Sylvia atricapilla*	Eurasian Blackcap	LC	-	P

IUCN Conservation status (IUCN, 2024): LC – Least concern; Endemism: E – Endemic; ; Occurrence: C Confirmed, P Potential.

Reptiles and mammals

The reptile community in São Vicente includes two species, both endemic to Cabo Verde: *Chioninia stangeri* and São Vicente wall gecko (*Tarentola substituta*). The São Vicente wall gecko, classified as Least Concern by IUCN, is only endemic to São Vicente Island and has a wide geographical range of distribution on the island and found under rocks in rocky barren plains and in other arid areas (R. Vasconcelos personal observation).

Mammals on São Vicente Island are represented by one rodent species, *Mus musculus*, and two species of bats, *Pipistrellus kuhlii* and *Pipistrellus hesperidus*.

Reptile and mammal species encountered on São Vicente Island are listed in Table 6-5, but neither were observed during the site visit carried out for the 2021 ESIA[11].

Table 6-5 Reptile and mammal species

Family	Scientific name	Common name	IUCN Conservation Status 2024	Endemism	Occurrence
Reptiles					
Scincidae	*Chioninia stangeri*	Stanger's Skink	NT	E	P
Phyllodactylidae	*Tarentola substituta*	São Vicente wall gecko	LC	E	P
Mammals					
Muridae	*Mus musculus*	House mouse	LC	-	P
Vespertilionidae	*Pipistrellus kuhlii*	Kuhl's Pipistrelle	LC	-	P
Vespertilionidae	*Pipistrellus hesperidus*	African Pipistrelle	LC	-	P

IUCN Conservation status (IUCN, 2024): LC – Least concern, EN – Endangered; E – Endemic, N – Native; and I – Introduced

6.4 Socioeconomic and Cultural Environment

6.4.1 Population

The project site is on São Vicente Island, in the municipality of São Vicente, in the parish of Nossa Senhora da Luz, inside the Parque Industrial de Lazareto, and near the Lazareto residential area.

The resident population of São Vicente Island, according to the 2022 census, was 78,137 inhabitants, 93.2% of whom were concentrated in urban areas. Men outnumbered women – 39,745 to 38,392.

The INE (National Statistics Institute) projects São Vicente Island populations of 80,526 inhabitants in 2030 and 83,069 inhabitants in 2040.[12]

[11] *ESIA_Implementation of BESS projects, São Vicente and Boa Vista islands, Future Proman, 2021*
[12] *INE Cabo Verde. Projeções demográficas da população por concelho e idade simples - 2010-2040, 2023*

The municipality of São Vicente was 15.3 % of the total population of the country in 2021 and projected by the census to be the second highest population concentration.

The population living in the Lazareto Industrial Park, according to the 2021 census, was limited to 13 individuals. In Lazareto residential area (about 300 m from the project site), there were 449 inhabitants in 2021[13], most of whom had secondary or basic education.

6.4.2 Health

The health infrastructure available on São Vicente Island is listed in Table 6-6. The Central Hospital, *Hospital Dr Baptista de Sousa*, is in Mindelo.

Table 6-6 Health infrastructure on São Vicente Island

Health infrastructure	Number
Central Hospital	1
Regional Hospital	0
Health Center	6
Reproductive Health Center	1
Health Station	0
Base Health Unit	3
Health Delegation	1

Anuário Estatístico 2020, INE Cabo Verde

6.4.3 Economy

São Vicente Island is characterized by an average 10% unemployment rate, which is lower than the total Cabo Verdean average (21%).[14] The rates of unemployment on São Vicente Island in terms of gender and age bracket are listed in Table 6-7 and Table 6-8, respectively.

Table 6-7 Unemployment rate by gender, São Vicente Island

Gender	%
Female	54.7
Male	45.3

INE, 2021

Table 6-8 Unemployment rate by age bracket, São Vicente Island

Age bracket	%
15-19	10.1
20-24	21.5
25-29	20.4
30-34	16.6
35-39	10.0
40-44	7.1
45-49	5.0
50-54	4.3
55-59	3.4
60-64	1.3
65+	0.5

INE, 2021

[13] *INE 2021, São Vicente. Zonas e Lugares*
[14] INE, São Vicente em Números, 2021

The sectors in which most inhabitants are employed on São Vicente Island are industry (16.5%), commerce (16.5%) and construction (12.4%).[15]

Tourism, which accounts for 4.6% of employment, is an economic activity of growing importance on the island. According to information provided by the Municipality of São Vicente, efforts are being made by the Municipality, in close coordination with the Government, to enable São Vicente to establish itself as a tourism destination with high added value in urban, cultural, nautical, and residential areas.

6.4.4 Education

Educational levels of São Vicente inhabitants, recorded during 2021, are listed in Table 6-9.

Table 6-9 Educational levels in São Vicente Island (population > 4 years old), 2021

São Vicente Education Level	% (Population > 4 years old)
None	7.7
Preschool	2.9
Literacy	1.0
Elementary	41.9
Secondary	4.0
High school	0.7
University	13.5

INE, 2021

6.4.5 Infrastructure

Drinking water supply

The water for human consumption in São Vicente Island is produced by Electra's desalination plant near Laginha beach. This treated water (public supply network) supplied 70.68 % of the population via truck tanks, aqueducts, and stationary tanks. This supply is very similar to the national average (71.5%).

The rest of the population is supplied by the neighbours, tankers, fountains or wells.

Basic sanitation

According to INE 2021 information, São Vicente Island is similar to the national average (85.54%) regarding the destination of wastewater to septic tanks and the sewage system. On São Vicente, the percentage of the population with a wastewater disposal system was about 85.5%, and more than 98% of the population has a method of disposing solid urban waste.

Access to electricity

Most of the electricity in São Vicente is produced and distributed by Electra S.A, which owns two diesel thermal power plants on the island. The access to electricity for illumination was 92.27% on São Vicente Island in 2021.[16]

[15] INE, São Vicente em Números, 2021
[16] INE, São Vicente em Números, 2021.

6.4.6 Land use

Land use

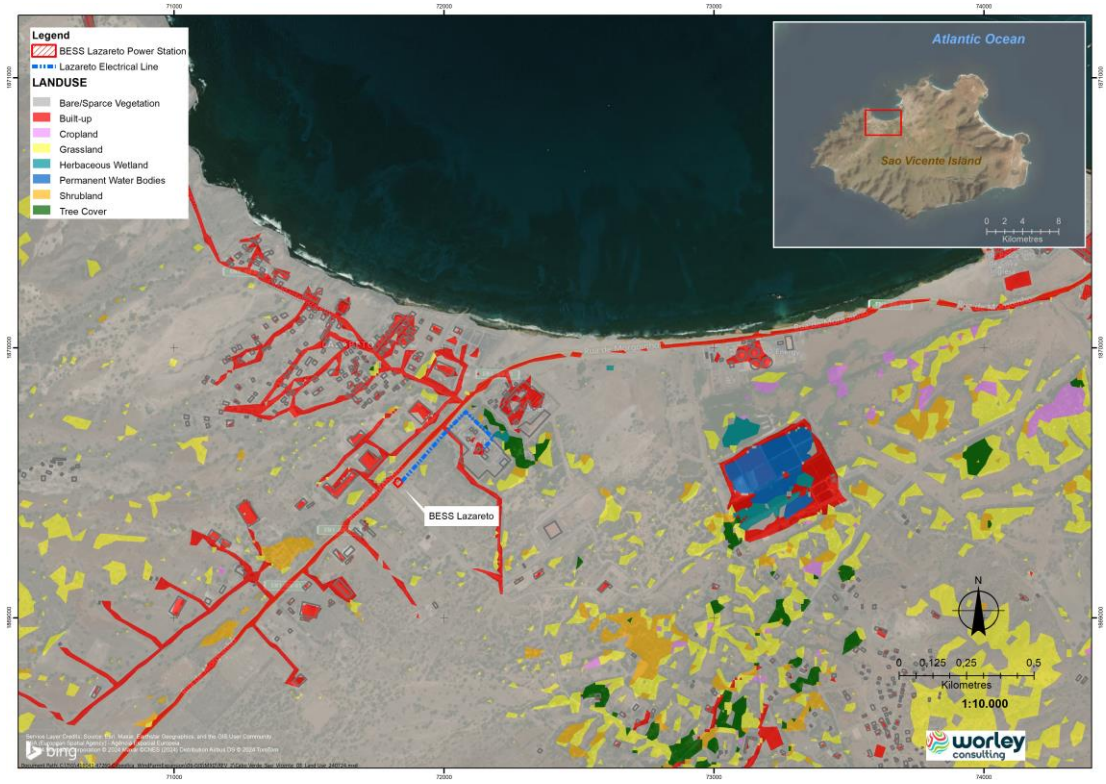
Currently, the Lazareto site has no human occupation and has a surface cover of light scrub. On the northern border of the site is a medium-sized acacia grove, which extends to the east of the site, and the western border is adjacent to the paved road that connects the Airport to Mindelo. To the south is an unpaved access road, which is shown in Figure 6-9.

Figure 6-9 Southern boundary of the Lazareto site

ESIA_Implementation of BESS projects, São Vicente and Boa Vista islands, Future Proman, 2021

According to information provided by the INGT, the Land Use and Vegetation Cover of the Lazareto site is defined as grassland, as indicated in Figure 6-10.

Figure 6-10 Land Use and Vegetation Cover in and around the BESS Lazareto site



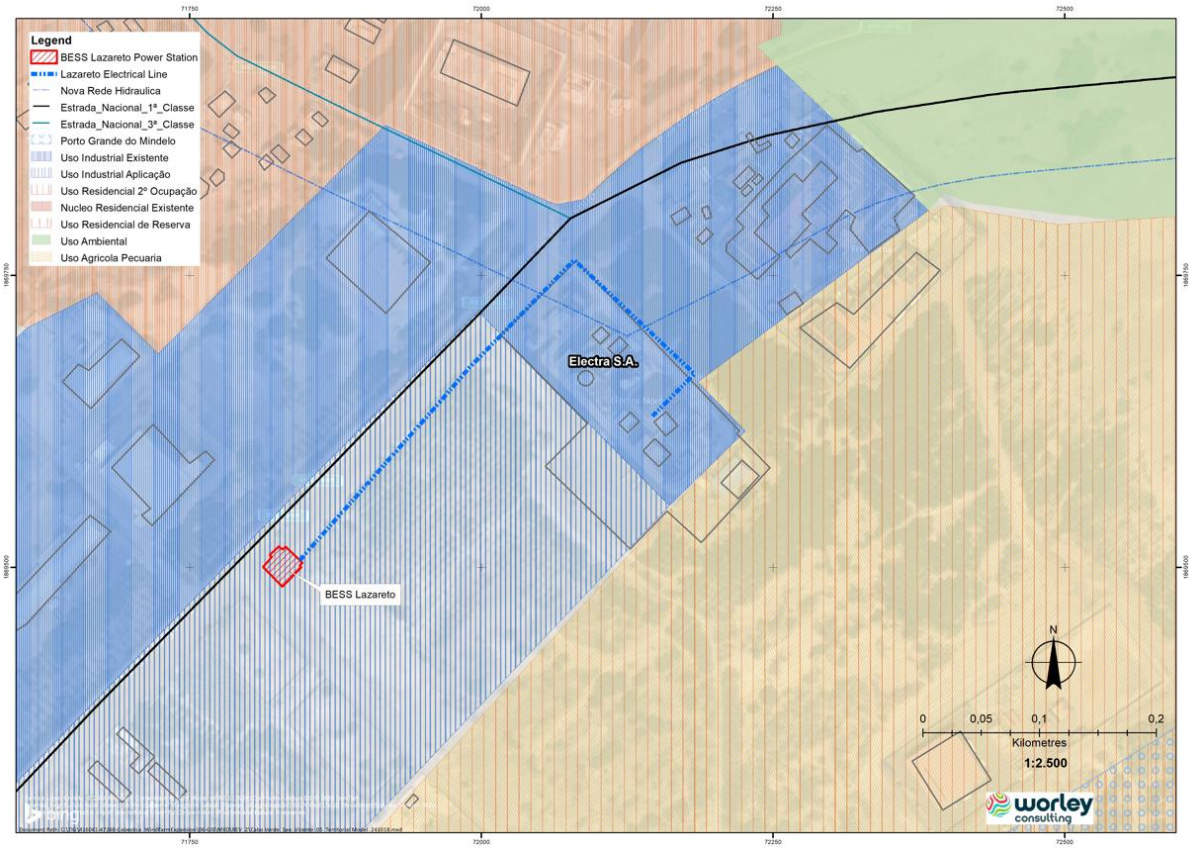
Territorial planning

The Government of Cabo Verde determined, through Resolution Nº 20/2011, of 24 May, the preparation of the Regional Spatial Planning Scheme for São Vicente Island, with the objectives of identifying public interests at a regional level and establishing the forecasts and restrictions related to the transformation of the covered areas with an adequate management of natural resources, contributing to the sustainable development of the island, integrating growth with environmental preservation.

Resolution Nº. 4/2014 of 8 January approves the Regional Spatial Planning Scheme of the Island of São Vicente, designated as the EROT-SV (*Esquema Regional do Ordenamento do Território*), whose regulations and graphic elements establish the Constraints Plan and Territorial Model published in the annex of the EROT-SV and are an integral part of the Resolution.

Spatial planning is reflected in the Territorial Model Plan, in which Lazareto site is categorized as a **"New Industrial Area"**, outlined in black in Figure 6-11. A New Industrial Area is defined as an area in which operations of preparation, transformation, repair, storage and/or distribution of products or goods are conducted, as well as the provision of services related thereto.

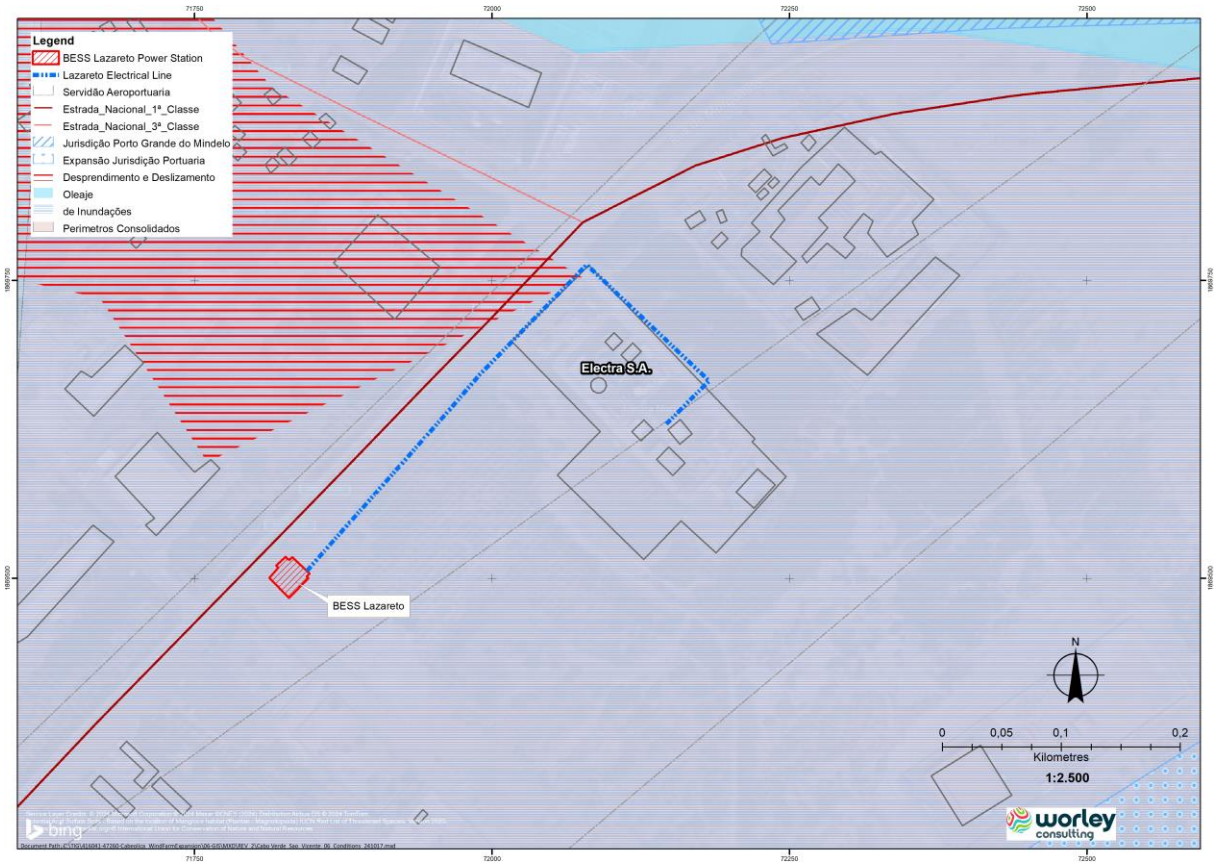
Figure 6-11 Territorial Model with the Lazarerato site outlined in black



Article 15 of the Regulation also establishes the environmental zoning criteria due to the compatibility of territorial and sectorial planning with the territory's natural resources supply. The study area is categorized as **Zone C**, which is defined as an area with an urban environment or characterized by the presence of large infrastructures and facilities. In Zone C areas, measures shall be taken to reduce environmental impacts resulting from the planned urbanization process.

The EROT-SV also identifies areas subject to special constraints. In particular, the Lazareto site is within a consolidated perimeter and flash flood risk zone. In addition, in the study area there is also a road servitude associated with the EN1-SV-01 (Mindelo-São Pedro Airport) and an aeronautical servitude associated to São Pedro Airport, as indicated in Figure 6-12.

Figure 6-12 Constrains Map with the Lazareto site outlined in red and underground cable in blue



6.4.7 Landscape

São Vicente is characterized by an arid landscape with sparse vegetation and isolated trees with exposed areas of bedrock and little or no topsoil". From a physiographic perspective, the island has great heterogeneity of relief, with some mountainous areas reaching 750 m and flatter areas closer to the coast.

The visibility of the Lazareto site is not influenced by obstacles, as described in Section 6.4.6.

The Lazareto site, considered an industrial area, is in an area with low slopes (0-10%), with human occupation, and without relevant elements of landscape appreciation. The terrain is visually exposed. In general terms, the landscape of the site and its immediate surroundings presents low visual quality and poor visual absorption capacity given the topographical characteristics, which results in a medium visual sensitivity. Ultimately, the site has medium potential for integration of the project into the landscape.

6.4.8 Cultural heritage

According to the previous ESIA (2021), the BESS site has no visible cultural heritage (either tangible or intangible), historical or archaeological value.

However, the potential presence of buried tangible cultural heritage artifacts within the site footprint cannot be excluded. Therefore, as per the ESMP, a chance finds procedure will be in place during the construction phase to manage any potential chance cultural heritage finds. All site workers, including EPC workers, will also undergo training in chance finds procedures as per the ESMP.

7 Key Environmental, Climate and Social Effects: Impacts and Risks

The Cabeolica Expansion Project in São Vicente will result in key environmental, climate, and social impacts due to the following, as preliminarily identified and described in the following subsections:

- Normal routine operations.
- Non-routine operations (major accidents) and natural disasters, if they were to occur.
- Cumulative effects with other developments present within the area of influence of the Cabeolica Expansion Project in São Vicente.

7.1 Impact Assessment for Routine Operations

Potential environmental and social impacts due to the Cabeolica Expansion Project in São Vicente were assessed at a preliminary qualitative or quantitative level where feasible and proportionate to the type of valued receptor being assessed.

The methodology followed and the results for preconstruction and construction, commissioning, operation and maintenance, decommissioning are described in Section 7.1.1 through Section 7.1.4, and the summary of potential impacts presented in Section 7.1.5. The mitigation and monitoring measures that could be implemented to avoid, minimise, or mitigate include proactive development and best practices. These measures are described in Section 8 and residual impacts (after mitigation measures are taken) are summarised in Section 9.

7.1.1 Methodology

This Simplified ESIA followed the method proposed by Conesa[17], starting with a focusing procedure to identify the key valued receptors (biological, physical, and human) of the Project area in São Vicente based on the baseline information detailed in Section 6. The potential positive and negative changes resulting from the project aspects were then predicted for the study area in São Vicente and for the entire project lifecycle using an impact identification matrix through which aspects and factors are correlated to find interactions that could result in impacts. Once identified, these predicted impacts were evaluated using a significance ranking process that accounts for the conservation value of the potential receptors. The assessment of the conservation values was conducted according to Advisian's experience and based on criteria defined by experts. The steps taken to complete the impact assessment are as follow (with the corresponding sections where they are described):

1. Identification and assessment of the valued receptors (Section 7.1.1.1)
2. Identification of the key project aspects (Section 7.1.1.2)
3. Identification of impacts (Section 7.1.1.3)
4. Evaluation of impacts during Pre-construction and Construction, Commissioning, Operation and Maintenance, and Decommissioning, (Sections 7.1.2, 7.1.3 and 7.1.3)

[17] Conesa, Guía metodológica para la evaluación del impacto ambiental, 2010.

The impacts from routine operations that would remain after the implementation of mitigation measures, called residual impacts, were evaluated as described in Section 7.1.1.5.

7.1.1.1 Project Valued Receptors

The evaluation of environmental impacts requires that the receiving environment will be divided into important or valuable components, called Valued Receptors (VR). A VR is any part of the environment or society considered important by the developer, operator and/or governmental organizations involved in the assessment process. VRs are categorized by considering the environmental and social values of each receptor based on the baseline information (Section 6) and, when possible, its fragility to project activities.

The category represents the sensitivity of the receptor to impacts due to project activities and classified as having a Low, Medium or High Importance Value, as outlined in Table 7-1. The more important VRs are weighting more significantly in the impact evaluation process. The same impact could be determined to be overall higher on a VR categorized as "High" than on a VR categorized as "Low".

Table 7-1 Valued Receptor (VR) Categorisation

VR CATEGORISATION	Low	Medium	High
Sensitivity	1	2	3

At a later stage in the process, the importance value assigned to a VR is related to the intrinsic significance of the impact on the environment, enabling global assessment of environmental and social impacts. Based on these criteria, the VRs listed in Table 7-2 were identified and assessed for Cabeolica Expansion Project component in São Vicente site (Component 4).

Table 7-2 Valued Receptor Evaluation: Cabeolica Expansion Project -São Vicente site

Valued Receptor		**Importance**	**VR Sensitivity**
Physical Environment	Global Climate and Air quality	MEDIUM	Potential sources of air emissions in the vicinity of the site, within 250 meters of the center point are, the Electra Power Station a civil construction site, a carpentry workshop, a transportation company (Polaris), a detergent production company (Químicas Cintila, Lda), a fish canning and fish feed production factory (large). The paved road connecting the airport with Mindelo is approximately 10 m west of the project area, and an unpaved access road is about 10 m south of the area. The former is a source of vehicle emissions and the latter of dust particles from the passage of vehicles.
	Acoustic environment (Noise)	MEDIUM	The Lazareto site is an industrial area where the main source of noise is traffic on the tarmac road, with low frequency, except during periods of entry and exit of the industrial facilities in the area. Lazareto residential area is the closest community and with nearest sensitive receptors (e.g., residential areas) at about 300 m north from the site.
	Topography	LOW	The Project area is a plateau with a minor slope (0-10%).

Valued Receptor		Importance	VR Sensitivity
	Hydrology and groundwater	LOW	Evidence of surface water bodies and groundwater abstraction is not encountered in the Lazareto site.
	Geology and soils	LOW	The Lazareto site falls within an area of Holocene dune - sand cover. The land is mostly in dune area and marginally in a very arid pasture area. Lithological materials that most directly influence the geology and soils of the site are essentially of eruptive origin.
Biological Environment	Flora	LOW	Flora at the Lazareto site is sparse with Acácia americana (*Prosopis juliflora*) (LC as per IUCN) (90% of coverage). Invasive species, such as *Nicotiana glauca* (Charuteira) and *Datura stramonium*, are also present. Shrub and herbaceous strata have low coverage in the site.
	Avifauna	MEDIUM	Two (2) avifauna species has been inventoried in project site area: Cabo Verde sparrow (*Passer iagoensis*), which is endemic to Cabo Verde and classified as LC by IUCN, and spectacled warbler (*Curruca conspicillata*), also classified as LC by IUCN but not endemic. However, the Lazareto BESS site does not support or contain habitat conducive to nesting or feeding for these species.
	Reptiles and mammals	MEDIUM	The reptile community in São Vicente is represented by two species, both endemic of Cabo Verde: *Chioninia stangeri* and São Vicente wall gecko (*Tarentola substituta)*, which is only endemic to São Vicente Island and classified as Least Concern by IUCN. Although the site is included in the geographic range of these species, their presence could not be confirmed during the 2021 visit. Mammals are represented by one rodent species, *Mus musculus*, and two species of bats, *Pipistrellus kuhlii* and *Pipistrellus hesperidus*, however none were observed during the site visit for the 2021 ESIA.
Socioeconomic and cultural environment	Population	MEDIUM	São Vicente is the second most populated island in Cabo Verde. The Lazareto site is in the municipality of São Vicente, approximately 300 m from the residential area of Lazareto in the north of the island.
	Local economy	MEDIUM	Approximately 93% of the São Vicente Island population live in urban areas. The sectors with the highest employment are industry (16.5%), commerce (16.5%), and construction (12.4%). São Vicente is characterized by a 10% average unemployment rate, which is lower than the total Cabo Verdean average.
	Infrastructure	MEDIUM	The Lazareto site is in an industrial area, close to the Electra Lazareto Power Station, several industries and shipyards in the surroundings, a paved road west of the study area, and an access road to the south. Roads leading from the delivery Port (a 5-km route, approximately) are tar-sealed and support heavy vehicular traffic. The study area is in service to a road associated with the Mindelo-São Pedro Airport and to an aeronautical route associated with this airport.
	Land Use	LOW	Currently, the Lazareto site has no human occupation and has a surface cover of light scrub. The site is categorized an a "New Industrial Area" by the EROT-SV Territorial Model Plan for São Vicente Island and as Zone C (areas with urban environment or characterized by large infrastructures and facilities).

Valued Receptor		Importance	VR Sensitivity
	Landscape	MEDIUM	The visibility of the site is not impacted by obstacles, and there are no relevant elements of landscape appreciation. The landscape of the site and its immediate surroundings presents low visual quality and poor visual absorption capacity, resulting in a medium visual sensitivity.
	Cultural heritage	LOW	According to the previous ESIA (2021), the BESS site has no visible cultural heritage artefacts. The potential presence of cultural heritage along the electrical connection corridor is currently unknown.

7.1.1.2 Project Aspects

Project aspects are elements of an organization's activities, products or services that can interact with the environment. A project aspect can lead to one or more positive or negative impacts and can result in significant environmental impacts.

Project aspects were preliminarily identified based on an analysis of all routine activities of each phase of the Cabeolica Expansion Project in São Vicente. Routine aspects of the Project that are likely to impact on VRs in São Vicente are listed in Table 7-3.

Table 7-3 Main Project Routine Aspects - São Vicente site

Project phase	Project Aspects
Pre-construction and construction phases	Site preparation, clearing and earthworks
	Installation of BESS: civil works, and electrical and mechanical works
	Transport of materials, equipment, waste and/or personnel
	Purchase of supplies, services, goods, and generation of job opportunities
	Restoration of temporary work areas
Commissioning, operation, and maintenance phase	Testing and commissioning of new equipment
	Physical presence of new component (BESS)
	Operation and maintenance of new component (BESS)
	Transport of goods, equipment, waste and/or personnel
	Purchase of supplies, services, goods, and generation of job opportunities
	Power storage
Decommissioning phase	BESS disconnection, isolation and removal
	Transport of materials, equipment, waste and/or personnel
	Purchase of supplies, services, goods, and generation of job opportunities
	Site restoration

7.1.1.3 Impact Identification

The "Impact Identification Matrix", which was developed and used to preliminarily identify potential impacts on the environment due to each phase of the Cabeolica Expansion Project in São Vicente site,

is reproduced in Table 7-4. This matrix compares each Project Aspect (see Table 7-3) with each Valued Receptor (see Table 7-2) and ensures consideration of all potential impacts. Potential impacts on receptors from particular project aspects are indicated by matrix cells shaded in orange for negative impacts and green for positive. The identified impacts are numbered according to the descriptions listed in Table 7-5.

Table 7-4 Preliminary Environmental and Social Impact Identification Matrix – Routine aspects -Cabeolica Expansion Project -São Vicente site

Project Phase	Project Aspect	Physical Environment				Biological Environment				Socioeconomic and Cultural Environment					
		Global climate and air quality	**Acoustic environment (Noise)**	**Topography**	**Hydrology and groundwater**	**Geology and soils**	**Flora**	**Avifauna**	**Reptiles and mammals**	**Population**	**Local economy**	**Infrastructure**	**Land Use**	**Landscape**	**Cultural heritage**
Pre-construction & Construction Phases	Site preparation and earthworks	1	2		3	4a, 4b	5a	6a	6a	7				11	15
	Installation of BESS: civil construction, electrical and mechanical works	1	2					6c	6c	7				11	
	Transport of goods, equipment, waste and/or personnel	1	2			4a	5a, 5b	6b, 6c	6b, 6c	7		10		11	
	Purchase of supplies, services, goods, and generation of job opportunities									8	9				
	Restoration of temporary work areas	1	2					6c	6c	7				11	
Commissioning, Operation and Maintenance Phase	Testing and commissioning of new equipment		2					6c	6c	8					
	Physical presence and operation of BESS													11	
	Transport of materials, equipment, waste and/or personnel	1	2					6c	6c	7		10			
	Purchase of supplies, services, goods, and generation of job opportunities									8	9				
	Power storage	12													
Decommissioning Phase	BESS disconnection, isolation and removal	13	2					6c	6c	7		14		11	
	Transport of materials, equipment, waste and/or personnel	1	2				5a, 5b	6b, 6c	6b, 6c	7		10		11	
	Purchase of supplies, services, goods, and generation of job opportunities									8	9				
	Site restoration	1	2					6c	6c	7					

Table 7-5 List of impacts under routine operations

ID	Impact description
1	Decreased air quality and impact on climate change
2	Increased ambient noise levels
3	Demand of water resources
4a	Soil loss, compaction and impacts on soil quality
4b	Demand of natural resources for construction materials
5a	Direct removal or damage to vegetation
5b	Impact on flora due to the introduction of invasive flora alien species
6a	Impact on fauna due to habitat loss
6b	Impact on fauna due to the introduction of invasive fauna alien species
6c	Disturbance to fauna
7	Impact on local communities due to noise, generated dust, and air pollution
8	Impact on local communities due to influx of construction workers and job seekers
9	Creation of employment, skills development, and business opportunities
10	Effects on local infrastructure due to increased traffic and waste generation
11	Change on the visual perception of landscape
12	Reduction in CO_2 emissions due to storage
13	Impact on global climate due to SF_6 release during decommissioning
14	Impact on waste management infrastructure due to decommissioning waste generation
15	Damage to cultural heritage resources

7.1.1.4 Impact Evaluation

The interaction between the significance of each impact (intensity and characterization) and the importance of each Valued Receptor enables the final assessment of each impact, which is dependent on the intrinsic value of the impact and the sensitivity and quality of the environment.

Calculation of Impact Importance

The importance of each impact was calculated based on the method proposed by Conesa (Conesa, 2010) and as adapted by Advisian, which is aligned with international guidelines[18]. An impact, which is an effect generated by a project or activity on an environmental component, is a function of the degree of occurrence according to certain variables, such as the intensity of the action and the extent and persistence of the resulting effect.

[18] International Finance Corporation (IFC). A Guide to Biodiversity for the Private Sector: The Social and Environmental Impact Assessment Process:
https://www.ifc.org/wps/wcm/connect/9608497e-56e8-4074-bab6-45c61a36a4ad/ESIA.pdf?MOD=AJPERES&CVID=jkCYZ3G

The impact importance is an estimate according to the qualitative effect that is produced. It is defined as the ratio according to which the environmental impact is measured based on the degree of intensity of the alteration produced and the characterization of the effect. This characterization is made based on qualitative attributes, such as intensity (IN), extent (EX), period of occurrence (MO), persistence (PE), reversibility (RV), synergy (SI), cumulative effect (AC), type of effect (EF), periodicity (PR) and recovery (MC). The attributes used to calculate impact importance are described in Table 7-6.

Table 7-6 Attributes for Qualitative Impact Assessment

<table>
<tr><td colspan="2">Nature: Defines the character of the impact, which can be NEGATIVE or POSITIVE.</td></tr>
<tr><td colspan="2">Intensity (IN): Degree of incidence of an action on the affected factor.</td></tr>
<tr><td>BIOPHYSICAL ENVIRONMENT: intensity can be considered in terms of the sensitivity of the receptor (i.e., habitats, species, or communities).
Negligible – the impact on the environment is not detectable.
Low – the impact affects the environment in such a way that natural functions and processes are not negatively affected, or these natural functions are enhanced to a small degree (in the case of positive impacts).
Medium – where the affected environment is altered but natural functions and processes continue, albeit in a modified way, or are considerably improved (in the case of positive impacts).
High – where natural functions or processes are altered to the extent that it will temporarily cease; or in the case of a positive impact, will be restored to close to its natural state in terms of functions and processes (in the case of positive impacts).
Total – where natural functions or processes are altered to the extent that it will permanently cease; or in the case of a positive impact, will be restored to its natural state in terms of functions and processes (in the case of positive impacts).
Where appropriate, national and/or international standards are to be used as a measure of the impact. Specialist studies should attempt to quantify the magnitude of impacts and outline the rationale used.</td><td>SOCIAL ENVIRONMENT: intensity can be considered in terms of the ability of Project affected people/communities to cope with or adapt to negative changes brought about by the Project, the degree to which their quality of life/wellbeing will be enhanced by the socio-economic benefits.
Negligible – no perceptible change to people's quality of life.
Low – people/communities can cope with/ adapt to negative impacts with relative ease and maintain pre-impact quality of life/wellbeing. People would marginally benefit from the proposed activity and would experience a relatively small improvement in quality of life/wellbeing (in the case of positive impacts).
Medium – able to cope with/adapt to negative impacts with some difficulty and maintain pre-impact livelihoods but only with a degree of mitigation support. People's quality of life/wellbeing is considerably improved by the benefits of positive impacts.
High – able to cope with/ adapt to negative impacts with important difficulties and maintain pre-impact livelihoods but only with important mitigation support. People will have their quality of life/wellbeing significantly improved in the case of positive impact.
Total – those affected will not be able to cope with/ adapt to negative changes and continue to maintain-pre impact quality of life / well-being. People will have their quality of life/ well-being highly improved in the case of positive impact.</td></tr>
<tr><td colspan="2">Extent (EX): Area of influence impacted, including the Project area and its surroundings.
Localized – impacts that are restricted to a particular location within the boundaries of the Project.
Partial – impacts that affect a wider area but that remain within the boundaries of the Project.
Extensive – impacts that affect an area around the boundaries of the Project.
Regional/National – impacts that affect regionally or national important environmental resources or are experienced at a regional/national scale as determined by administrative boundaries, habitat type/ecosystem.
Critical – impacts (localized or not) that affect a critical area.</td></tr>
<tr><td colspan="2">Moment (MO): The period before an impact takes effect refers to the time between the onset of an action and the beginning of an effect on the environmental factor under consideration.
Immediate – when the impact appears when zero time has elapsed.
Short-term – when the impact appears within a year.
Medium-term – if an impact appears between 1 and 10 years.
Long-term – when the impact takes longer than 10 years to manifest.</td></tr>
<tr><td colspan="2">Persistence (PE): The period that the impact will presumably last from the moment it appears to the moment the previous conditions return by natural means or due to corrective measures. The impact is considered:
Momentary – if the duration of the impact is almost zero
Brief – if the impact lasts less than a year
Temporary – if the impact lasts between 1 and 10 years
Persistent – if the impact lasts between 11 and 15 years
Permanent – if the impact lasts more than 15 years</td></tr>
</table>

Reversibility (RV): The possibility of reconstructing the element affected by the project by natural means without human intervention. The impact will be **reversible** if the environmental factor can return to the original conditions in a period of less than 15 years. The reversibility can be: **Short-Term** – within a year **Medium-term** – between 1-10 years **Long-term** – between 11 and 15 years If the affected element cannot be reconstructed without human intervention within a period of 15 years, the effect is considered **irreversible by natural means**.
Synergy (SI): The combination of two or more simple effects, the result of which if produced simultaneously is higher than the impact of simple effects occurring independently. The impact can be: **Non-synergistic** – effects of an action are independent without synergistic effects. **Synergistic** – effects of two or more actions are produced simultaneously resulting in a higher impact. **Highly synergistic** – effects of two or more actions are produced simultaneously resulting in a much higher impact.
Accumulation (AC): The progressive increase in amount of the effect when the impact persists in time. The effect can be: **Simple (non-cumulative)** – impact whose action is individualized, without consequences in the induction of new effects, neither in its accumulation nor in its synergy. **Cumulative** – impact that results in a progressive increase in the amount of the effect by lacking the means of elimination, when the action that causes the impact persists in time. Cumulative impacts are also those that result from the incremental impact of the action over a common receptor when added to other past, present, and reasonably foreseeable future actions regardless of who undertakes such other actions.
Effect (EF): The cause-and-effect relationship, also known as consequences of an action. The effect can be: **Direct** – effect is a direct consequence of an action. **Indirect effect** – is an indirect consequence of an action.
Periodicity (PR): The impact manifests as: **Irregular and discontinuous** – repetition of an effect in an unpredictable way. **Continuous** – constant in time. **Periodic** – in a cyclical and recurrent way.
Recoverability (MC): The possibility of a total or partial recovery/restoration of the environmental parameter/receptor or process affected by the Project through the implementation of corrective measures. The effect can be: **Immediately recoverable** – recovery/restoration to its original condition with the implementation of corrective measures as soon as the action that causes the impact ceases. **Recoverable in the short-term** – recovery/restoration to its original condition with the implementation of corrective actions within a period less than a 1 year. **Recoverable in the medium-term** – recovery/restoration to its original condition with the implementation of corrective actions between 1 and 10 years. **Recoverable in the long-term** – recovery/restoration to its original condition with the implementation of corrective actions between 11 and 15 years. **Mitigable** – the effect is partially recoverable via corrective actions. **Compensable** – the effect is not recoverable via corrective actions but is subject to compensation. **Not recoverable** – the effect is not recoverable via corrective actions, or the time of recovery/restoration is more than 15 years.

The importance of an impact is assigned a weighting value based on these attributes, each of which is categorised by associated values, as summarised in Table 7-7.

Table 7-7 Value of Attributes

Nature (S)		**Intensity (IN)**	
Positive impact	+1	Negligible	1
Negative impact	-1	Low	2
Extent (EX)		Medium	4
Localized	1	High	8
Partial	2	Total	12
Extensive	4	**Moment (MO)**	
Regional/National	8	Long-term	1
Critical	+4*	Medium-term	2
Persistence (PE)		Short-term	3
Brief	1	Immediate	4
Momentary	1		
Temporary	2	**Reversibility (RV)**	
Persistent	3	Short-term	1
Permanent	4	Medium-term	2
Synergy (SI)		Long-term	3
No synergy	1	Irreversible	4
Synergistic	2	**Effect (EF)**	
Highly synergistic	4	Indirect (secondary)	1
Periodicity (PR)		Direct	4
Irregular and discontinuous	1	**Recovery (MC)**	
Periodic	2	Immediately recoverable	1
Continuous	4	Recoverable at short-term	2
Accumulation (AC)		Recoverable at medium-term	3
Simple	1	Recoverable at long-term	4
Cumulative	4	Mitigable/ Compensable	4
		Not recoverable	8

** For impacts that occur within critical areas, 4 is added to the corresponding extension value.*

The following formula of weighted attributes is used to calculate impact importance (Im):

$$Im = \mathrm{S}\,(3 * IN + 2 * EX + MO + PE + RV + SI + EF + PR + MC + AC)$$

Where, Im ranges from 13 to 100.

Assessment of environmental and social impacts

Significance values for each impact indicate which impacts are more relevant. The impact significance is used to determine whether the impacts are compatible, moderate, severe, or critical. The following Impact Importance (Im) categories are assigned to impacts based on importance values (absolute values) adapted from the method proposed by Conesa (Conesa, 2010):

- Negligible: $I_m \leq 20$
- Low: $20 < I_m \leq 40$
- Medium: $40 < I_m \leq 60$
- High: $60 < I_m \leq 85$
- Very high: $I_m > 85$

Once the components are assessed and the magnitude for each impact is known, the significance of the environmental and social impact is assessed by combining the characteristics of the impact and the environmental and/or social value of the impacted component, as listed in Table 7-8.

Table 7-8 Impact Significance: Impact Significance

		Impact Importance				
		Negligible	Low	Medium	High	Very High
Valued Receptor Importance	Low	COMPATIBLE	COMPATIBLE	COMPATIBLE	MODERATE	SEVERE
	Medium	COMPATIBLE	COMPATIBLE	MODERATE	SEVERE	CRITICAL
	High	COMPATIBLE	MODERATE	SEVERE	CRITICAL	CRITICAL

Source: Advisian

These impact categories are defined based on the work of Conesa (Conesa, 2010), as summarized in Table 7-9.

Table 7-9 Definitions of Impact Significance Categories

CRITICAL	Impacts above an acceptable threshold, implying a permanent loss of quality of the environmental conditions without possible recoverability regardless of the implementation of preventive or corrective measures. These impacts are irrecoverable.
SEVERE	Impacts that require intensive preventive or corrective measures to return the environmental factor to its original conditions, and although preventive or corrective measures are implemented, the recoverability period is *medium- or long-term*.
MODERATE	Impacts that do not require intensive preventive or corrective measures and the period needed to return to original conditions is limited, can be a temporary, reversible and/or recoverable on the *short- or medium-term*. Corrective measures are advisable, and intensive measures are not required.
COMPATIBLE	Impacts that are immediately recoverable once the action has stopped and do not require preventive or corrective measures. Compatible impacts are *immediately reversible* and persist briefly and do not require corrective measures.
POSITIVE	Impacts that result in improvement of the quality of the receptor.

Source: Conesa (2010), modified by Advisian

7.1.1.5 Residual Impacts

Residual impacts refer to impacts related to a project that persist after the implementation of preventive and/or corrective measures. Once mitigation measures are proposed, the impact significance is reassessed assuming the mitigation measure will either eliminate or reduce its importance. This reassessment is undertaken for impacts categorised as being more significant than COMPATIBLE prior to the implementation of mitigation measures.

7.1.2 Impacts during Pre-construction and Construction Phases

7.1.2.1 Physical Environment

AIR QUALITY AND CLIMATE CONDITION

Decreased air quality

Air quality and climate condition may be affected during construction activities due to the emissions of particulate matter (dust) and combustion gases, including greenhouse gases (GHGs), which have the potential to impact on global climate by increasing atmospheric GHG concentrations.

The main sources of airborne particulate matter are disturbed and exposed soils during site preparation and construction activities, such as excavation works and vehicle movements on unpaved surfaces. Wind action across unpaved roads and surfaces will enhance dust generation, and off-road driving over stone pavement and gravel plains will disturb the top protective layer, exposing underlying fine materials that will be transported during windy days and will increase dust and particle emissions.

The main sources of combustion gases[19] will be heavy construction equipment (engines and generators) and vehicles used to transport equipment, materials, and personnel from Port location and accommodation areas to the site.

Equipment and transport requirements for the Cabeolica Expansion Project in São Vicente site is expected to be reduced given that pre-construction and construction works will be limited to the transport of the containers for the BESS and associated equipment, as well as the minimal site grading and the electrical and mechanical works required for the chosen BESS location.

The reduced impact of earth movements and the limited traffic of machines and vehicles for the installation of the BESS, as well as the absence of sensitive receptors in the immediate vicinity of the BESS site (e.g., residential areas), mean that foreseeable impacts on air quality will not be significant. Therefore, the importance of the impact on air quality due to pre-construction and construction activities is assessed as low and the overall impact significance as COMPATIBLE.

ACOUSTIC ENVIRONMENT (NOISE)

Increased ambient noise levels

Ambient noise levels will be affected directly by using equipment, vehicles, and machinery associated with construction activities. The operation of heavy construction equipment may also cause vibrations in the immediate project surroundings.

In addition, road traffic noise will be increased while trucks are transporting equipment, waste, personnel, and other supplies to and from the site. Noise due to transport activities will be heavily dependent on the number of trucks, the sizes of trucks, and the road surface.

As with the decreased air quality impact due to equipment and transport requirements for BESS Project in São Vicente, noise emissions are expected to be reduced given that pre-construction and construction

[19] Carbon monoxide (CO), carbon dioxide (CO_2), nitrogen oxides (NO_X), nitrous oxide (N_2O), methane (CH_4), sulphur dioxide (SO_2), particulate matter (PM), and volatile organic compounds (VOCs).

works will be limited to the transport of the modules for the BESS and associated equipment and minimal civil, electrical and mechanical works required for the BESS components.

Given the limited extent of construction activities, that sensitive receptors (e.g., residential areas) are not within 300 m of the site, and that the highest levels of noise will be limited to the project site and immediate vicinity, this impact is assessed as low and the overall impact significance as COMPATIBLE,

GEOLOGY AND SOILS

Soil loss, compaction and impacts on soil quality

Site preparation activities and civil works required for BESS will involve the removal of upper and subjacent soil horizons resulting in soil loss. By removing the natural erosion protection (vegetation cover), construction activities could also lead to increased erosion and run-off from the site.

The footprint of potential soil loss will be reduced at the Lazareto site, being limited to the area occupied by the temporary work areas (200–300 m^2), the underground cables trench (400 m^2) and the module containers (maximum area of 735 m^2). In total is estimated that Component 4 will take approximately 1,435 m^2.

Other sources of potential impacts on soil include:

- Transport of equipment, personnel, and material, which will contribute to soil compaction, and
- Inappropriate waste management practices or inadequate vehicle/equipment maintenance, which may compromise soil quality.

Given the reduced footprint of the project and the fact that these activities will take place in an industrial area, where soil conditions were previously altered without significant observed erosion, the importance of this impact is assessed as low and the overall significance as COMPATIBLE.

Demand of natural resources for construction materials

During civil works, cement, concrete and raw materials will be locally sourced and transported to the site from existing licensed quarries and suppliers. The BESS platform construction will require limited quantities of construction materials and, consequently, these have a negligible impact on the local and São Vicente Island natural resources and ecosystem services.

Thus, the demand of construction materials is assessed as low importance, and the impact is assessed as COMPATIBLE.

HYDROLOGY AND GROUNDWATER

Demand of water resources

During pre-construction and construction activities, water will be used for consumption by the workforce, as well as to produce concrete for BESS civil works described above. Water will be supplied using trucks from local suppliers and stored onsite in tanks.

The source and estimated volume of water are not available at this stage and will be confirmed by the EPC Contractors during the contract execution periods. However, in order to assess the impact on the demand on water resources the following estimates have been made for the following uses during construction:

- Estimates for water consumption for workforce are in the range of ~25 litres/worker/day for domestic use and sanitation and ~ 5 litres/worker/day for potable, drinking water (total of 300 l/day in for a peak workforce of 10 workers in São Vicente).

- No estimates are available for the water volumes required for the concrete works required for the BESS foundations and warehouse building, but this are not expected to be significant.

Given the above, the water requirements for the pre-construction and construction phase are considered as having a negligible impact on the local and São Vicente Island water resources and ecosystem services. Therefore, the importance of this impact is assessed as low and the overall significance as COMPATIBLE.

7.1.2.2 Biological Environment

FLORA

Direct removal or damage to vegetation

Project activities during the pre-construction and construction phases will cause direct habitat loss, modification, and fragmentation of vegetation cover due to the clearance and occupation of areas for the BESS, its auxiliaries, the storage areas for heavy machines, and other technical installations.

Project activities during the pre-construction and construction phases will involve site preparation and earthworks activities in which topsoil and deeper soil layers will be removed and partially disturbed during these activities. Areas used as temporary work areas and eventually used to store equipment will also require the removal of limited amounts of vegetation.

As discussed previously, the footprint of potential soil loss and vegetation removal will be reduced at São Vicente site, being limited to the area occupied by the temporary work areas (200–300 m^2), the underground cables trench (400 m^2) and the module containers (maximum area of 735 m^2).

The BESS will be located in an industrial area with low vegetation cover with individuals of Acácia americana (*Prosopis juliflora*) (LC as per IUCN), which covers the 90% of the vegetation surface, and some shrub and herbaceous strata with low coverage.

The direct impact on flora and vegetation is not expected to be significant because the site is in a modified habitat with low vegetation and the project footprint is reduced, and no sensitive species have been identified.

Given the above, the importance of the impact on vegetation is assessed as low and the overall significance is COMPATIBLE.

FAUNA

Impact on fauna due to habitat loss

Site preparation activities may contribute to the loss or alteration of habitats in the intervention area by changing vegetation patterns, changing features that shelter fauna, and/or directly disturbing nests and burrows. As described above, the BESS will be installed in a modified habitat and distant from protected areas (approximately 8 km).

The presence of two species has been confirmed: Cabo Verde sparrow (*Passer iagoensis*), and spectacled warbler (*Curruca conspicillata*), both classified as Least Concern by IUCN and the first one endemic to Cabo Verde. However, the Lazareto BESS site does not support or contain habitat conducive to nesting or feeding for these species. Thus, the magnitude of the impact is assessed as low, and the impact significance is COMPATIBLE for avifauna.

The reptile community is represented on the island by two species, both endemic to Cabo Verde: *Chioninia stangeri*, and São Vicente wall gecko (*Tarentola substituta)*, which is endemic only to São Vicente Island. Although the site is included in the geographic range in which these species are potentially present, their presence could not be confirmed during the 2021 visit,. Therefore, the impact due to habitat loss cannot be excluded. However this impact will be reduced in extent due to the limited footprint of the project, and its importance with respect to reptiles is assessed as low. Given the above, the overall significance is COMPATIBLE. Nonetheless, the ESMP includes mitigation measures if the presence of these species is identified prior to construction activities (see 8.1.1).

Impact on fauna and flora due to the introduction of invasive flora and fauna alien species

The movement of equipment and construction vehicles to site has the potential to introduce invasive alien species to the project site and its adjacent areas from other islands or the continent. Once introduced, invasive species are often very hard to eradicate and will colonise the area permanently.

Invasive species are the main cause of degradation of loss of plant diversity in Cabo Verde[20]. In Cabo Verde Biodiversity Database there is record of 448 introduced taxa, equivalent to 60% of the flora previously described in the archipelago, estimated at 738 taxa. These pressures are likely to be worst in islands with higher agricultural potential, namely Santo Antão, São Nicolau, Santiago and Fogo.

Acacia americana (*Prosopis juliflora)*, also present in São Vicente, has merited major concerns in Boavista island, where it occupies a large area of dunes, to the detriment of the date palms (*Phoenix atlântica*). This has contributed particularly to degradation of the dunes landscape on the island, one of the main focuses of tourist attraction.

In animal diversity, invasive reptile species have become a danger to endemic reptiles and their insects, as these form a basis of their food.

The project will involve vehicle movements within the island (from the Port to the project site) and among islands. BESS and other project components will have passed through import checks prior to being cleared for movement to site. Taking this into account the impact in both flora and fauna receptors is assessed of medium intensity and low importance. The overall significance is COMPATIBLE for both receptors.

Disturbance to fauna

Local fauna may be disturbed during site preparation activities, installation of the BESS, and transport of materials, personnel, and equipment. Impacts may include direct mortality or injury of species during vehicle movements and various construction operations, and disturbances could be caused by noise and vibration, by air pollutant and dust emissions, and by light pollution during construction.

Impacts will only occur within close proximity of the project site and will result in a small increase in baseline noise levels and movements of vehicles. The increase in the number of vehicle movements associated to the project construction may also increase the mortality of fauna (particularly slow moving or cryptic species) along roads.

Given that the BESS will be located in a previously modified habitat, close to the existing power station and industrial activities and due to the reduced scale of the project, the importance of this impact is assessed as negligible both for avifauna and reptiles. Thus, the overall significance of impact before mitigation is assessed as COMPATIBLE for all species.

[20] CBD Fifth National Report – Cabo Verde (English version): https://www.cbd.int/doc/world/cv/cv-nr-05-en.pdf

7.1.2.3 Socioeconomic and Cultural Environment

POPULATION

Impact on local communities due to noise, and generated dust and air pollution

During the pre-construction / construction phase, several types of machinery and heavy equipment will operate at the site, which will increase the noise level in the project area and reduce local air quality due to dust and air pollutant emissions and have a potential impact on residents in proximity. The nearest sensitive receptor (e.g., residential area) is Lazareto village, approximately 300 m from the proposed site.

Equipment and transport requirements for the new BESS are not expected to be significant given that pre-construction and construction works will be limited to the transport of the modules for the BESS, as well as the minimal site grading, foundation, and electrical works required for the BESS location. Given the reduced dimensions of the project and the limited duration of pre-construction and construction activities, the importance of this impact on local communities is assessed as low and the overall significance of this impact is assessed as COMPATIBLE.

Impact on local communities due to influx of construction workers and job seekers

The limited influx of construction workers may pose a risk to local communities, including increases in anti-social behaviour, crime, substance abuse, prostitution, Gender-Based Violence (GBV), spread of Sexually Transmitted Diseases (STDs), unplanned pregnancies, impact on family networks and structures, and competition for scarce resources.

During the pre-construction and construction phase, a reduced workforce is foreseen (a peak of 10 workers estimated), so the project is considered low risk for the issues described above given the limited scale of the potential influx. Workers will be accommodated in near-by communities. Where possible and practicable to do so, construction personnel will be sourced locally, although this option will depend on the EPC Contractor economically viable offer for the works.

In addition to the Grievance Redress Mechanism (GRM), Cabeolica will conduct Staff Awareness Training and will provide Codes of Conduct to be subscribed at the level of companies, managers and workers involved in the BESS project, including provisions for Environmental, Social, Health and Safety (ESHS) and Occupational Health and Safety (OHS) standards, and for the prevention of Gender Based Violence (GBV) and Violence Against Children (VAC).

Given the limited number of workers and the relatively short duration of activities (preconstruction 3 months and construction 9 months), the importance of this impact is assessed as negligible, and the overall significance is assessed as COMPATIBLE.

LOCAL ECONOMY

Creation of employment, skills development, and business opportunities

The pre-construction and construction phase may create potential employment and skills development opportunities for local community members. The expected workforce of 10 for the Cabeolica Expansion Project in will be sourced locally where possible. Construction-related opportunities are likely to be limited to low skilled jobs and will be temporary in nature. The presence of personnel in the area could increase local demand for goods and some construction materials from local suppliers, which may positively impact local trade.

The significance of this impact is assessed as POSITIVE.

INFRASTRUCTURE

Effects on local infrastructure due to increased traffic and waste generation

During the construction phase, road traffic associated with the transport of materials, workers, and BESS components to the site will increase. Nonetheless, transport requirements for the project will be limited and focused on the transport of the modules for the BESS, associated equipment and materials for construction.

The transport and procurement of BESS modules and equipment will be delivered via the road leading from the delivery Port (approximately 5 km), which is tar-sealed and supports heavy vehicular traffic.

In addition, limited quantities of waste will be generated during the construction phase which will generate a demand for local waste infrastructure:

- During construction, sanitary waste streams will be generated from domestic water use and from portable toilets. The wastewater will be appropriately collected in dedicated septic tanks, which will be emptied and serviced on a regular basis by an approved contractor.
- Solid waste is likely to include limited quantities of construction waste (debris, discarded concrete, empty drums) and municipal solid waste (paper, cardboard, plastic and other packages, food waste). Municipal waste will be collected in dedicated containers onsite and disposed of by an approved contractor at the local municipal landfill. Construction waste will be reused to the extent possible in construction activities or alternatively will be recycled, where practicable, or disposed of at a landfill, as per the WMP (Doc. No. 06106-416041-47260-B-06-0029).

Given the limited increase in traffic and waste generation during this phase, the importance of this impact on local infrastructure is assessed as negligible, and the overall impact significance is assessed as COMPATIBLE.

LANDSCAPE

Change on the visual perception of landscape

Visual impacts during the construction phase will be mainly related to the removal of vegetation cover, the erection of temporary facilities, the installation of the BESS components, and the presence of machinery, vehicles, and equipment.

Given that the Cabeolica Expansion Project in São Vicente will take place close to an industrial area, the removal of vegetation will be localized, and the geomorphology will remain unchanged, the importance of this visual impact is assessed as negligible. Consequently, the overall impact significance is assessed as COMPATIBLE during construction.

CULTURAL HERITAGE

Damage to cultural heritage resources

According to previous 2021 ESIA, there are no visible cultural heritage (either tangible or intangible), historical or archaeological in São Vicente Project area. Moreover, the site is located in an industrial area with previously disturbed areas of ground.

Given the above, the importance of this impact is assessed as low importance, and the overall impact significance is assessed as COMPATIBLE. Nonetheless, as per the ESMP, a chance find procedure will be

in place during the construction phase to deal with the finding of previously unknown heritage resources, particularly archaeological resources.

7.1.3 Impacts during Commissioning, Operation and Maintenance Phase

7.1.3.1 Physical Environment

AIR QUALITY AND CLIMATE CONDITION

Decreased air quality

Significant emissions are not expected during the operation phase. Only limited numbers of workers (5 indirect positions) and vehicle movements will be required during occasional and planned maintenance activities. Their presence will not be permanent, and they will be resourced from the BESS provider.

The impact due to the emission of exhaust gases (CO_2, NO_x, SO_2, PM and VOCs) on air quality during these activities is anticipated to be transient and limited to the surroundings of the project activities.

The importance of this impact is assessed as negligible, and the overall impact significance during this phase is assessed as COMPATIBLE.

Reduction in CO_2 emissions due to storage

The São Vicente BESS Project will contribute to fuel savings and improved decarbonization factors by installing a spinning reserve operated BESS that will provide sufficient time for additional generator start-up and grid synchronization instead of relying exclusively on diesel generators.

One BESS benefit is the reduced use of fossil fuels and the subsequently reduced emissions of greenhouse gases. BESS can assist in better energy management by reducing the use of peaking generation. Energy storage can also support the extended introduction of variable renewable energy generation by firming, smoothing, and shifting/shaving the power generated by these resources. Thus, this impact is assessed as POSITIVE.

ACOUSTIC ENVIRONMENT (NOISE)

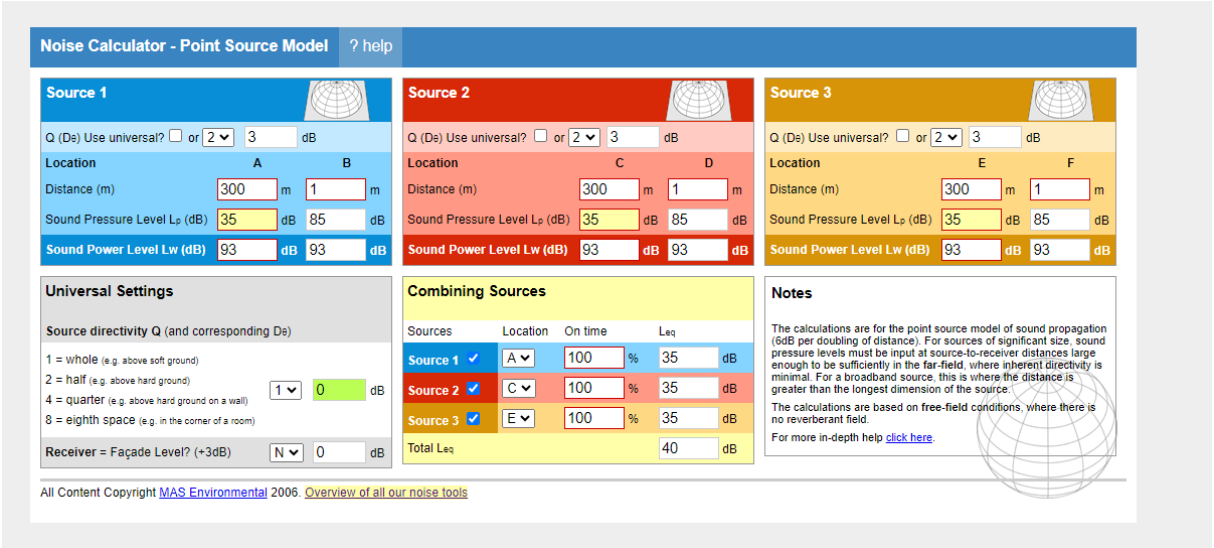
Increased noise levels

During operation, the BESS is not expected to emit significant noise levels, as their noise emissions are comparable with that of electrical substations. The main sources of noise emissions are the transformers, power conversion systems, and fans and pumps of the heat exchangers and chillers with sound power levels between 60-92 dB (see Section 3.5.5). Nearby receptors are industrial activities and that the nearest residential receptors are located at 300-m distance.

The Noise Calculator -Point Source Model[21] was used to anticipate sound pressure level at the nearest sensitive receptor from the BESS site (i.e. 300 m). The three (3) PCS inverters constitute the source of noise with the highest sound power (92.6 dB). As shown in Figure 7-1 the combination of these three sources will result in a total L_{eq} of 40 dB which is below the night noise limit set for sensitive areas in Law 34/VIII/2013. It should be noted that these sources of noise will be enclosed in metal or block buildings / enclosures, so noise emissions impacts will be reduced below the levels indicated.

[21] Noise Tool Calculator: https://noisetools.net/noisecalculator

Figure 7-1 Estimated sound pressure level at sensitive receptors caused by BESS operation



Noise Tool Calculator: https://noisetools.net/noisecalculator

Other sources of noise during this phase will be the limited number of workers and vehicle movements, which will be required during commissioning, operation, and maintenance activities of the BESS components. Their presence is not permanent and therefore will be an intermittent and time-limited source of noise.

Given that nearby receptors are industrial activities and that the nearest residential receptors are located at 300-m distance, the impact importance is assessed as low and the overall significance during this phase is assessed as COMPATIBLE.

7.1.3.2 Biological Environment

FAUNA

Disturbance to fauna

A limited number of workers and vehicle movements will be required during commissioning, operation, and maintenance activities of the BESS. Their presence will not be permanent and will be resourced from the BESS provider.

Assuming that routine activities and movements of vehicles and workers will be limited to roads and areas designed for operation and maintenance, no impacts on avifauna, reptiles or other mammals are anticipated during BESS operation other than disturbances due to noise and the presence of workers and vehicles in the area.

The importance of this impact is considered negligible and the overall importance during this phase is assessed as COMPATIBLE.

7.1.3.3 Socioeconomic and Cultural Environment

POPULATION

Other impacts on local communities during operation

As with the Physical Environment, BESS operation is not expected to emit significant noise levels, which will be comparable with that of electrical substations. Other sources of air emissions and noise during this phase will be the limited numbers of workers and vehicle movements required during commissioning, operation, and maintenance activities of the BESS components. Their presence is not expected to be permanent and will be resourced from the BESS provider.

The importance of this impact is considered low and the overall significance during this phase assessed as COMPATIBLE.

LOCAL ECONOMY

Creation of employment, skills development, and business opportunities

At a strategic level, the Cabeolica Expansion Project in São Vicente will support the continued growth of the local and national economy by providing important energy storage to ensure stability of the Cabo Verde grid.

As with the construction phase, a POSITIVE economic impact during operation may result from local employment created by the project, if any. Whilst the likely nature of these impacts is largely unchanged from the construction phase, they will be less significant During operation, five indirect jobs will be created. These workers will be sourced by the BESS provided and will be involved in the occasional and planned maintenance activities during a period of 15 years (with the possibility of being extended to 20 years to cover all the battery life period).

The impact of this impact is assessed as POSITIVE.

LANDSCAPE

Change on the visual perception of landscape

During the operation phase, the BESS components will be housed in containers and will permanently occupy a small area in close proximity to the ELECTRA Lazareto Power Station. Therefore, the BESS will resemble the type of buildings in the surroundings and will not have a major intrusive effect on the landscape.

The importance of the impact is considered low, and the overall significance is assessed as COMPATIBLE.

7.1.4 Impacts during Decommissioning Phase

The potential impacts resulting from this phase are expected to be similar to those predicted for construction (e.g., air and noise), except for the impacts associated with SF_6 release and waste generation.

Impact on global climate due to SF_6 release

When the dismantling of the electrical equipment begins, the envelope/enclosure containing the SF_6 should be carefully set aside. This gas will be collected and reclaimed at an appropriate facility and reused in new equipment. The importance of this impact is evaluated as low and the overall significance of SF_6 releases on this receptor will be COMPATIBLE.

Impact on waste management infrastructure due to waste generation

Significant quantities of wastes are expected to be generated during the decommissioning phase. BESS containers will be removed from the site and transported to approved facilities for reuse, recycling or disposal. The transformers will be removed and, with appropriate handling to prevent oil leaks, will be transported to a designated location for reprocessing where the oil will be removed from the transformers and sent for recycling or disposal at approved waste management facilities.

The Cabeolica Expansion Project Waste Management Plan (Doc. No. 06106-416041-47260-B-06-0029) should be updated prior to starting this phase after identifying available and appropriate final disposal/recycling facilities. In general, the decommissioning should be accomplished according to the applicable regulations in force at the time of starting these activities.

At present, there are no appropriate hazardous wastes disposal facilities in Cabo Verde. Therefore, it is planned by Cabeolica that, at the end of their operational life or cessation of operations, an agreement will be in place with the BESS suppliers for their removal and shipping to an approved BESS recycling facility in the EU.

The importance of this impact is evaluated as low, and the overall significance is COMPATIBLE.

7.1.5 Summary of Potential Environmental and Social Impacts

The identified and evaluated impacts associated with the Project were assessed to determine their significance with respect to the valued receptors identified in the area of influence. The significance of the negative impacts that may result from routine operations range as COMPATIBLE before mitigation measures are implemented and some impacts are POSITIVE. Impacts on the physical, biological, and socioeconomic environments due to Pre-construction/Construction and Commissioning, Operation and Maintenance and the specific impacts due to Decommissioning of the BESS project are summarized in Table 7-10. Impacts will be reduced with the implementation of mitigation measures proposed in Section 7.1. The residual impacts are described in Section 9.

Table 7-10 Summary of Routine Impacts for São Vicente BESS

Project Phase	Valued Receptor	Impact	Impact Magnitude												Impact Im	Valued Receptor Assessment	Impact Significance
			NA	IN	EX	MO	PE	RV	SI	AC	EF	PR	MC	Im			
Pre-Construction & Construction	Global Climate and Air Quality	Decreased air quality and impact on climate change	-1	2	2	4	1	1	1	1	4	1	1	-24	LOW	MEDIUM	COMPATIBLE
Pre-Construction & Construction	Acoustic Environment (Noise)	Increased noise levels	-1	2	2	4	1	1	1	1	4	1	1	-24	LOW	MEDIUM	COMPATIBLE
Pre-Construction & Construction	Geology and Soils	Soil loss, compaction and impacts on soil quality	-1	4	1	4	4	2	1	1	4	1	2	-33	LOW	LOW	COMPATIBLE
Pre-Construction & Construction	Geology and Soils	Demand of natural resources for construction materials	-1	1	1	4	4	3	1	1	4	4	3	-29	LOW	LOW	COMPATIBLE
Pre-Construction & Construction	Hydrology and groundwater	Demand of water resources	-1	1	1	4	4	3	1	1	4	4	3	-29	LOW	LOW	COMPATIBLE
Pre-Construction & Construction	Flora	Direct removal or damage to vegetation	-1	4	1	4	3	2	1	1	4	1	3	-33	LOW	LOW	COMPATIBLE
Pre-Construction & Construction	Flora	Impact on flora due to the introduction of invasive flora alien species	-1	4	2	2	3	3	1	1	4	1	3	-34	LOW	LOW	COMPATIBLE
Pre-Construction & Construction	Reptiles and Mammals	Impact on fauna due to habitat loss	-1	4	1	4	2	2	1	1	4	1	2	-31	LOW	MEDIUM	COMPATIBLE
Pre-Construction and Construction	Reptiles and mammals	Impact on fauna due to the introduction of invasive fauna alien species	-1	4	2	2	3	3	1	1	4	1	3	-34	LOW	MEDIUM	COMPATIBLE
Pre-Construction & Construction	Avifauna	Disturbance to fauna	-1	1	1	4	1	1	1	1	4	1	2	-20	NEGLIGIBLE	MEDIUM	COMPATIBLE
Pre-Construction & Construction	Reptiles and Mammals	Disturbance to fauna	-1	1	1	4	1	1	1	1	4	1	2	-20	NEGLIGIBLE	MEDIUM	COMPATIBLE
Pre-Construction & Construction	Population	Impact on local communities due to noise, generated dust and air pollution	-1	2	1	4	1	1	1	1	4	1	1	-22	LOW	MEDIUM	COMPATIBLE
Pre-Construction & Construction	Population	Impact on local communities due to influx of construction workers and job seekers	-1	1	1	4	1	2	1	1	1	1	3	-19	NEGLIGIBLE	MEDIUM	COMPATIBLE

Project Phase	Valued Receptor	Impact	Impact Magnitude												Impact Im	Valued Receptor Assessment	Impact Significance
			NA	IN	EX	MO	PE	RV	SI	AC	EF	PR	MC	Im			
Pre-Construction & Construction	Local Economy	Creation of employment, skills development, and business opportunities	1	1	2	4	1	1	1	1	4	1	1	21	POSITIVE	MEDIUM	POSITIVE
Pre-Construction & Construction	Infrastructure	Effects on local infrastructure due to increased traffic and waste generation	-1	1	2	4	1	1	1	1	4	1	1	-21	NEGLIGIBLE	MEDIUM	COMPATIBLE
Pre-Construction & Construction	Landscape	Change on the visual perception of landscape	-1	1	1	4	1	1	1	1	4	1	1	-19	NEGLIGIBLE	MEDIUM	COMPATIBLE
Pre-Construction and Construction	Cultural heritage	Damage to cultural heritage resources	-1	1	1	4	4	4	1	1	4	1	4	-28	LOW	LOW	COMPATIBLE
Commissioning, Operation and Maintenance	Global Climate and Air Quality	Decreased air quality and impact on climate change	-1	1	1	4	1	1	1	1	4	1	1	-19	NEGLIGIBLE	MEDIUM	COMPATIBLE
Commissioning, Operation and Maintenance	Global Climate and Air Quality	Reduction in CO_2 emissions due to storage	1	4	8	4	3	3	1	1	4	4	3	51	POSITIVE	MEDIUM	POSITIVE
Commissioning, Operation and Maintenance	Acoustic Environment (Noise)	Increased ambient noise levels	-1	2	2	4	1	1	1	1	4	4	1	-27	LOW	MEDIUM	COMPATIBLE
Commissioning, Operation and Maintenance	Avifauna	Disturbance to fauna	-1	1	1	4	1	1	1	1	4	1	2	-20	NEGLIGIBLE	MEDIUM	COMPATIBLE
Commissioning, Operation and Maintenance	Reptiles and Mammals	Disturbance to fauna	-1	1	1	4	1	1	1	1	4	1	2	-20	NEGLIGIBLE	MEDIUM	COMPATIBLE
Commissioning, Operation and Maintenance	Population	Impact on local communities due to noise, generated dust, and air pollution	-1	2	2	4	1	1	1	1	4	4	1	-27	LOW	MEDIUM	COMPATIBLE
Commissioning, Operation and Maintenance	Local Economy	Creation of employment, skills development, and business opportunities	1	1	2	4	1	1	1	1	4	1	1	21	POSITIVE	MEDIUM	POSITIVE
Commissioning, Operation and Maintenance	Landscape	Change on the visual perception of landscape	-1	1	2	4	4	4	1	1	4	4	8	-37	LOW	MEDIUM	COMPATIBLE
Decommissioning	Global Climate and Air Quality	Impact on global climate due to SF_6 release during decommissioning	-1	2	2	4	3	3	1	1	4	1	3	-30	LOW	MEDIUM	COMPATIBLE

Project Phase	Valued Receptor	Impact	Impact Magnitude												Impact Im	Valued Receptor Assessment	Impact Significance
			NA	IN	EX	MO	PE	RV	SI	AC	EF	PR	MC	Im			
Decommissioning	Infrastructure	Impact on waste management infrastructure due to decommissioning waste generation	-1	2	1	4	2	2	1	1	4	1	2	-25	LOW	MEDIUM	COMPATIBLE

7.2 Major Accidents and Natural Disasters

Non-routine events can include major accidents, natural disasters, abnormal operations, or emergency situations. These events are not planned but have a non-negligible probability of occurring. Although the probability is low, the resulting impacts could be relevant and were assessed to determine the need for prevention and mitigation measures.

The identified scenarios with environmental and socioeconomic consequences are listed with the possible consequences described in Section 7.2.1.

All identified VRs, discussed in Section 6, could be affected by non-routine events and natural disasters. The frequency of occurrence of each accident scenario and the description of the predicted resulting environmental consequences on each receptor (physical, biological, and socio-economic) are summarized in Section 7.2.2.

Although measures to prevent these events from occurring are planned, uncertainties remain in the ability to fully control potential accidents. All possible mitigation efforts must be in place to minimize their occurrence and/or to reduce the consequences if they occur. Prevention and mitigation measures designed to reduce the probability and consequences of non-routine events are outlined in Section 7.2.3 and further detailed in Section **8.1.2**.

7.2.1 Methodology

The assessment of accidental events and natural disasters considers both the probability and the environmental consequences to estimate the potential risk under each scenario. For non-routine scenarios risk assessment process is only focused on accident scenarios with environmental and socioeconomic consequences, and prevention and mitigation measures for each scenario are identified. The risk criteria of an event are based on a combination of Consequence (C) and Frequency (F), and the levels or risk are categorised using a four-colour scheme, as described in Table 7-11. The consequences and probabilities (frequencies) of potential accidents and non-routine events are ranked in the risk assessment matrix (see Figure 7-2) to evaluate the risks at the Cabeolica Expansion Project in São Vicente.

Table 7-11 Assessment criteria for the risk assessment

Type	R = C x F[22]	Necessary Actions
Minor Risk	R ≤ 14	No additional measures other than applicable technical standards and legal requirements are required.
Moderate Risk	14 < R ≤ 35	Approved risk reduction measures that demonstrate as low as reasonably achievable (ALARP) must be implemented before start-up. Risk reduction measures that demonstrate ALARP must be implemented within 5 years from the date of the risk assessment.
High Risk	35 < R ≤ 82	Approved risk reduction measures that demonstrate ALARP must be implemented before start-up. Risk reduction measures that demonstrate ALARP must be implemented within 2 years from the date of the risk assessment.
Urgent Risk	R >82	Risk reduction measures until tolerable levels must be implemented before start-up. Immediate risk reduction measures must be adopted.

[22] (R) Risk, (C) Consequence and (F) Frequency

Figure 7-2 Risk Assessment Matrix

Accident Scenario Frequency			$<10^{-6}$	10^{-6} to 10^{-5}	10^{-5} to 10^{-4}	10^{-4} to 10^{-3}	10^{-3} to 10^{-2}	10^{-2} to 10^{-1}	10^{-1} to 1	1 to 10
Value			0.4	0.8	1.5	3	6.2	12.5	25	50
Area of assessment			Has not been heard of in industry at worldwide level	Has not happened in activity at worldwide level	Has happened before in activity at worldwide level	Has happened every 5-10 years in activity at worldwide level	Has happened before in activity at Company level	Happens every 5-10 years in activity at Company level or anytime at Site	Happens annually in activity at Company level or every 5-10 years at site	Happens monthly in activity at Company level or annually at site
Consequences										
Level of Consequences	Environmenta and/or social damage	Value (1/year)								
Trivial	No environmental / social damage. Leak/spill does not reach environmental media.	0.5								
Low	Non-significant environmental / social damage. No remediation required. Immediate recovery of the environmental / social damage.	1.4								
Moderate	Relevant environmental / social damage. Possible fine. Exceeds "reference limits" or property limits.	3				2				
Serious	Serious environmental / social damage. Largely exceeds reference limits. May significantly affect third parties.	7				3				
Very serious	Very serious environmental / social damage. Relevant spill/leak. Compensation measures.	16				1				
Disastrous	Catastrophic environmental / social damage. Loss of resources and environmental services. Almost permanent damages.	40			4					
Catastrophic	Catastrophic environmental / social damage. Large loss of resources and environmental / social services. Permanent damages.	100								

The scenarios for potential accidents and non-routine events that could occur at São Vicente site are listed in Table 7-12 with their potential consequences. These scenarios focus on accidental and unplanned events that could result in environmental and socioeconomic impacts. The frequency of occurrence of each accident scenario and the description of the predicted resulting environmental impacts on each receptor (physical, biological, and socioeconomic) are furthered described in Section 7.2.2. Once each scenario was assessed and categorized by applying this matrix, prevention and mitigation measures were proposed for reducing those risks. Considering the implementation of these measures, potential risks were reassessed to obtain residual risks.

Table 7-12 Potential accidents and non-routine events with environmental and socioeconomic consequences

No.	Scenario	Activity	Environmental & social consequences
1	Fire and explosion accidents	Electrical works during construction, maintenance, and decommissioning activities Overheating and thermal runaway of BESS	1. Air quality impact. 2. Damage to local flora 3. Damage or disturbance to fauna 4. Disturbance to population and workers
2	Accidents / Collision of vehicles	Transport and procurement of components and equipment Waste transportation Personnel mobilization	1. Disturbance to fauna 2. Injury or loss of lives
3	Leaks and spills of hazardous substances and waste	Hazardous substances storage and management Transport of components, waste, and equipment Use of machinery and equipment Maintenance activities	Release of hazardous substances and waste, causing: 1. Impacts on soil and water resources 2. Impacts on local flora 3. Impacts on local fauna
4	Occurrence of flash floods in São Vicente Island	N/A. (Climate hazard)	Flash floods, causing: 1. Impacts on soil and water resources 2. Impacts on local flora 3. Impacts on local fauna 4. Impact on nearby local communities, workers, security, or occasional maintenance staff

7.2.2 Definition of non-routine scenarios

7.2.2.1 Fire and explosion accidents

Fire and/or explosion accidents can occur due to short-circuiting during electrical works carried out during all project phases. The following main activities could cause this type of accident:

- Electrical works on the installation of the electrical infrastructure and underground cables of the BESS during construction activities.
- Overheating and thermal runaway of the BESS.
- Maintenance activities of electrical components of the BESS during operation and maintenance activities.

- Removal and dismantling of electrical components of the BESS during decommissioning.

Lithium-ion batteries contain flammable electrolytes, which can create hazards when the battery cell is compromised and enters thermal runaway. The initiating event is frequently a short circuit that may be the result of overcharging, overheating or mechanical abuse. The typical consequence is cell rupture and the release of large volumes of flammable and potentially toxic gases, which can lead to fire and explosions.[23]

This risk could impact on air quality due to released air pollutants during fire and explosion, the types of which would depend on the composition of the flammable material as well as the temperature. This impact on ambient air quality would also be highly dependent on such factors as duration of the fire and meteorological conditions.

Local flora at the BESS site could be damaged, but the magnitude of this impact would depend on the scale of the fire. Apart from animals present at the immediate accident location that could be directly injured, animals are expected to quickly escape the area due to noise and heat radiation, resulting in minimal injury to local fauna.

Fire and explosion may cause injury to workers and could disturb surrounding industrial activities and receptors, including nearby local residential communities (the closest of which is approximately 300 m from the site) depending on the scale of the fire.

Consequences could be very serious, and the frequency of occurrence is expected to be medium (happens every 5-10 years worldwide); therefore, the significance of this non-routine scenario is assessed as HIGH.

7.2.2.2 Accidents / Collision of vehicles

Vehicle collisions and accidents related to vehicles, materials, and equipment movements to and from the site, as well as during the transport of commuting workers between their accommodations and the site, may result in injuries or loss of life, as well as disturbance to and risk of collision with local fauna.

The main causes of this type of event could be weather conditions, driver fatigue, and/or distracted driving, among others.

Local fauna may be injured if some animals are in the precise location of the accident or collision of vehicles, leading to a loss of species. However, due to site conditions, significant damage to local fauna is not anticipated.

Traffic volume is expected to be low during the construction phase. During operation and maintenance activities, the number and frequency of vehicles at the site will be minimal.

Consequences are expected to be moderate (potential environmental and/or social damage exceeding property limits), and the frequency is assessed as medium because this type of event has happened every 5-10 years for this activity worldwide. Consequently, the significance of this risk is assessed as LOW.

[23] Conzen *et al.*, Lithium-ion battery energy storage systems (BESS) hazards. Journal of Loss Prevention in the Process Industries, Volume 81, 2023.

7.2.2.3 Leaks and spills of hazardous substances and waste

A leak or spill of hazardous substances, waste, or oil could occur as a non-routine event during any project phase. The main causes include the following:

- Inadequate storage of hazardous materials without implementing protection measures.
- Inadequate management of waste.
- Inadequate vehicle maintenance.
- Uncontrolled spills or leaks of oil from vehicles, equipment, and machinery.
- Uncontrolled spills or leaks of hazardous containers.
- Uncontrolled spills or leaks of hazardous substances during maintenance activities.

Should soil contamination be observed, the area of the impacted soil will be delineated, and the soil will be excavated and removed. The contaminated material will be disposed of at an approved and appropriate facility. The removed soils will be replaced with appropriately compatible material. Such measures are required to prevent accidental spills from reaching groundwater, resulting in contamination.

Spills and leaks may negatively affect the terrestrial ecology and biodiversity. The extent and magnitude of this impact is highly dependent on the material/chemical released in terms of composition and volume. Flora may be affected by contact with hazardous substances.

Accidental releases during transportation, including during the transport of such waste for disposal, may impact on local fauna, mainly mammals and reptiles, and biodiversity if not immediately contained.

The frequency of occurrence is medium because this type of event has happened every 5-10 years in activity at the worldwide level and the consequences would be serious (serious environmental damage, which may affect third parties). Therefore, the significance of this impact is assessed as MODERATE.

7.2.2.4 Occurrence of flash floods in São Vicente

Floods pose the most significant and recurring natural risk to Cabo Verde[24], and São Vicente Island is considered one of the four most vulnerable islands to flooding. Periods of intense and concentrated precipitation contribute to a significant loss of soil and generate powerful torrents due to the steep slopes that are filled with small-sized materials. The poor vegetation cover also contributes to creating particularly active dynamics for water courses. Of the islands, São Vicente has the third highest number of recorded events with a significant number of displaced residents, suggesting a higher frequency of this hazard. This increase is directly related to rapid urban growth that has led to housing construction, some of which are illegal, as well as roads, which often follow or cross small riverbeds. Although waterways are dry during most of the year and sometimes for years at a time, they can fill rapidly during more intense and prolonged rainfall. The accelerated and

[24] Disaster Risk Profile Cabo Verde. Africa Disaster Risk Financing Initiative, 2019, The World Bank.

at times unregulated construction process is one of the more important key factors in the heightened vulnerability in the face of flash floods[25].

It should be noted that the EROT-SV identifies the BESS site to be within a consolidated perimeter and flash flood risk zone.

Failure to adequately plan for flood events during the construction and operation of the Cabeolica Expansion Project in São Vicente site can result in considerable damage onsite, construction delays, and detrimental effects on the environment, such as soil and bank erosion, siltation or landslides, damage to vegetation, and pollutants carried by flood water, which can impact on water quality, habitats, and flora and fauna.

The frequency of occurrence is low (has happened before worldwide), but the consequences may be disastrous, with catastrophic environmental and social damage and the loss of resources and environmental services. Consequently, the significance of this risk is assessed as HIGH.

7.2.3 Risk Analysis Results

The non-routine event scenarios that could occur during the BESS Project were assessed prior to the implementation of mitigation measures using the descriptors described in Section 7.2.1. Several prevention and mitigation measures for each scenario were proposed to reduce the frequency of an impact and/or the consequences. Assuming the implementation of these measures, the risks associated with each scenario were reassessed to obtain the residual significance of risks. The results of this analysis, culminating in the assessment of the risks before and after the implementation of prevention and mitigation measures, are provided in Table 7-13. This table contains a summary of the preventive and mitigation measures, which are described further in Section 8.1.2.

[25] Martins B, Nunes A, Lourenço L, Velez-Castro F. Flash Flood Risk Perception by the Population of Mindelo, S. Vicente (Cabo Verde). Water. 2019; 11(9):1895. https://doi.org/10.3390/w11091895

Table 7-13 Risk scenarios before and after implementation of prevention and mitigation measures

Item	Scenario	Environmental & Social Consequences	Potential Risk			Preventive and mitigation measures	Residual Risk		
			C*	F*	Risk		C*	F*	Risk
1	Fire and explosion accidents	Air quality impact. Damage to local flora. Damage or disturbance to fauna. Disturbance to population and workers.	16	3	High risk	1. Develop and implement an Emergency Response Plan and a Health and Safety Plan for all facilities (MiN 1). 2. Implement the Cabeolica and EPC contractor training programmes as given in the ES manual and EPC contract to ensure that personnel onsite respond in a timely manner to accidents, incidents and in the event of an emergency (MiN 7). 3. Ensure regular inspection and maintenance of electrical equipment and fittings to avoid the risk of fire (MiN 10). 4. Provide fire and explosion protection, suppression and relief equipment and suitable PPE (MiN 15). 5. Ensure that fire response equipment is routinely inspected, maintained, and operationally exercised and tested, and is available as necessary for response (MiN 11) 6. Implement best practices for mitigating BESS hazards (see MiN 16). 7. Coordinate with local fire services and provide specific information about the facility, as necessary, so that the most effective firefighting methods can be determined and mobilised (MiN 12). 8. Install circuit breakers in the power supply for equipment to prevent excessive current flow and hazards due to possible short-circuiting (MiN 13). 9. Train and familiarise employees involved in electrical works with the safety-related work practices, safety procedures and other safety requirements related to their respective job assignments (MiN 14).	7	1.5	Minor Risk
2	Accidents / Collision of vehicles	Disturbance to fauna. Injury or loss of lives.	3	3	Minor Risk	1. Develop and implement an Emergency Response Plan and a Health and Safety Plan for all facilities (MiN 1). 2. Implement the Cabeolica and EPC contractor training programmes as given in the ES manual and EPC contract to ensure that personnel onsite respond in a timely manner to accidents, incidents and in the event of an emergency (MiN 7). 3. Ensure driver safety training is provided and verify driver qualifications (MiN 17). 4. Ensure that traffic plan is appropriate to cover all transport arrangements (MiN 18). 5. Movement of vehicles shall be restricted to the identified routes (MiN 19).	1.4	1.5	Minor Risk
3	Leaks and spills of hazardous	Release of hazardous substances and waste causing impacts on: • Soil and water resources,	7	3	Moderate Risk	1. Develop and implement an Emergency Response Plan and a Health and Safety Plan for all facilities (MiN 1).	1.4	1.5	Minor Risk

Item	Scenario	Environmental & Social Consequences	Potential Risk			Preventive and mitigation measures	Residual Risk		
			C*	F*	Risk		C*	F*	Risk
	substances and waste	• Local flora, and • Local fauna.				2. Implement the Cabeolica and EPC contractor training programmes as given in the ES manual and EPC contract to ensure that personnel onsite respond in a timely manner to accidents, incidents and in the event of an emergency (MiN 7). 3. Maintain good housekeeping at all times (MiN 5). 4. Subject vehicles and other equipment to regular maintenance and inspections to prevent fuel and lubricant spills and leaks (MiN 20). 5. Ensure that spill response and containment equipment are routinely inspected, maintained, and operationally exercised and tested, and are available as necessary for response (MiN 21). 6. Clearly display MSDS and safety instructions in the storage areas (MiN 6).			
4	Occurrence of flash floods	Flash flood, causing impacts on: • Soil and water resources, • Local flora, • Local fauna, and • Nearby local communities, workers, security, or occasional maintenance staff.	40	1.5	High Risk	1. Design site drainage (during construction and operation) to account for the likely Storm Event Intensity for the area (MiN 29). 2. Develop and implement an Emergency Response Plan and a Health and Safety Plan for all facilities (MiN 1). 3. Alignment with Cabo Verde Emergency Preparedness and Response Plans (MiN 29). 4. Implement the Cabeolica and EPC contractor training programmes as given in the ES manual and EPC contract to ensure that personnel onsite respond in a timely manner to accidents, incidents and in the event of an emergency (MiN 7).	16	1.5	Moderate Risk

** Consequence (C), and Frequency (F)*

7.3 Cumulative Impacts

A cumulative impact is the addition of an impact due to the project to impacts from other relevant developments (past, present, and reasonably foreseeable), and could include unplanned but predictable activities enabled by the project that may occur later or at a different location. Cumulative impacts can result from individually minor but collectively significant activities taking place over a period of time.[26] While each impact may be limited in and of itself, impacts can gradually cause degradation of important resources when taken together and given sufficient time. Cumulative impacts can also be positive when beneficial aspects of different projects reinforce one another.

The environmental impact assessment for routine and non-routine operations (Sections 7.1 and 7.2, respectively) considered the impacts due to the Cabeolica Expansion Project in São Vicente site Project. Other existing activities in the vicinities of the Lazareto BESS site are summarized in Table 7-14.

Table 7-14 Activities and infrastructures in the vicinity of São Vicente site

Project in the vicinity	Remarks
ELECTRA Lazareto Power Station	Located northeast of BESS site.
Industries and shipyards	Industries and shipyards are located in the surroundings of the study area (within about 250 m), e.g., Carpilux Servios de Carpintaria, Químicas Cintila, Tecnicil Indústrial S.V., and Armazem Polaris CIA.
Mindelo-San Pedro Airport Road	The paved road connects São Vicente airport with Mindelo and extends west of the project area.

The potential cumulative impacts on VRs that are susceptible to cumulative impacts are described below in qualitative terms.

7.3.1 Air Quality and Climate Condition

Air emissions will increase, mainly during construction activities (see Section 7.1.3.1). The main sources of airborne particulate matter (dust) will originate from disturbed and exposed soils during site preparation and construction activities, such as excavation works and vehicle movements on unpaved surfaces. The main sources of combustion gases will be heavy construction equipment and vehicles used to transport equipment, materials, and personnel from Port locations and accommodations to the site.

The air quality of the BESS site is affected by the presence of several industries and the circulation of vehicles on the tarmac road, which connects the San Pedro airport with Mindelo.

Among the industries, the Electra Parcela Power Station is the most relevant contributor to the deterioration of local air quality as a stationary source of nitrogen oxides (NO_X) and sulphur dioxide (SO_2) emissions and a significant source of mercury (Hg), fine particle emissions, and carbon dioxide (CO_2). Other industries and shipyards are in the vicinity of the BESS site, but the nature of their activities would contribute low levels of emissions and do not deteriorate air quality to a significant level.

[26] AfDB "Integrated Safeguards System", 2023.

The emissions from circulating vehicles (mainly NO_x, CO and CO_2) on the Mindelo-San Pedro Airport road are not expected to impact significantly on air quality at the Project site, as the volume of traffic is low except during periods of entry and exit from the existing industrial facilities in the area.

Considering the above and the short duration of construction activities (estimated in 9 months), and assuming the implantation of the mitigation measures to reduce this impact, the significance of the cumulative impact on air quality and climate condition is assessed as COMPATIBLE.

7.3.2 Acoustic Environment (Noise)

The main sources of noise during construction are expected to be site preparation activities, installation of new components, and increased traffic during the transport of equipment, materials, and personnel from Port locations and accommodations. Cumulative effects during construction activities are not expected to be significant given their short duration (9 months) and the mitigation measures that will be in place to reduce this impact.

During operation, the BESS is not anticipated to emit significant noise pressure because all sources of noise will be enclosed in metal or block building/enclosures and is not expected to contribute significantly to existing background levels, which will be dominated by the higher noise levels of the ELECTRA Lazareto Power Station. Given that nearby receptors are industrial activities and that the nearest residential receptors are located at 300-m distance, the significance of the cumulative impact on the acoustic environment is assessed to be COMPATIBLE.

7.3.3 Flora and Fauna

Site preparation activities may contribute to the loss or alteration of habitats within the project site boundaries and along access corridors.

The overall impact on habitat loss and the connectivity of ecosystems by the proposed project and other developments in the area is expected to be minimal due to the reduce scale of the Cabeolica Expansion Project in São Vicente and the industrial nature of the larger area.

Considering the above, the significance of the cumulative impact on flora and fauna due to habitat loss or alteration is assessed to be COMPATIBLE.

7.3.4 Local economy

As discussed in Section 3.2, the Electricity Sector Master Plan for Cabo Verde (2017-2040) has established ambitious targets for renewable energy penetration of 30% by 2025 and more than 50% by 2030. Energy Storage is expected to meet 10% of the targets, and the BESS to be installed in São Vicente is part of this Master Plan.

The Cabeolica Expansion Project will improve the decarbonisation and diversification of the country's energy matrix and will allow for a more stable grid system to reduce the frequency of blackouts in the country.

The potential for the project and other future projects to result in greater impacts will depend on the growth of the sector on the island.

Overall, the significance of this cumulative impact on the local economies due to the Cabeolica Expansion Project in in São Vicente is assessed as POSITIVE.

7.3.5 Infrastructures

During pre-construction and construction, the circulation of heavy machinery and vehicles may deteriorate the access roads. However, the transport requirements will be reduced and limited to the transport of the modules for the BESS and materials for construction.

Given that this activity will be limited to pre-construction and construction and the proposed mitigation measures to be implemented, the significance of the cumulative impact on infrastructure with existing circulation is assessed to be COMPATIBLE.

7.3.6 Landscape

Visual impacts during the construction phase will be mainly related to site preparation activities, installation of BESS components, and transport of materials, goods, and personnel. The removal of vegetation will be localized, and alterations to the landscape will be insignificant and temporary.

During operation, the overall visual impact by the project in São Vicente combined with other developments in the area will be limited given that the BESS will be modular with reduced dimensions in an industrial area.

Therefore, the significance of the cumulative visual impact is assessed to be COMPATIBLE.

8 Mitigation Measures and Monitoring Plan

The following sections present the proposed mitigation measures, with specific recommendations for routine impacts (Section 8.1.1) and non-routine impacts (Section 8.1.2), to be integrated into the Cabeolica Expansion Project in São Vicente site through the commitments made in the Monitoring Plan, described in Section 8.2.

Appendix A includes a site-specific Environmental and Social Management Plan (ESMP) for the Component 4 of Cabeolica Expansion Project, which provides the framework for implementing measures to eliminate, reduce and mitigate negative impacts that have been identified for the Cabeolica Expansion Project in São Vicente to acceptable levels and to promote and enhance positive impacts. This Appendix is a stand-alone document which includes a summary of the main environmental and social impact and risks, along with mitigation and monitoring measures and defines roles and responsibilities, training and capacity building initiatives, reporting requirements and indicators, along with a schedule and a budget for the implementation of the project ESMP.

8.1 Mitigation Measures

8.1.1 Mitigation measures for Routine Impacts

The potential impact on Valued Receptors resulting from the Cabeolica Expansion Project in São Vicente that were evaluated as COMPATIBLE could further lower or eliminate the significance of impacts. When mitigation measures are assumed to have been applied, the resulting impacts are referred to as Residual Impacts.

Mitigation measures include design measures, technical controls and procedures and management activities. Generally, the impact mitigation hierarchy is as follows:

1. Prevention
2. Minimization
3. Restoration
4. Compensation

The objectives of mitigation have been mainly established through legal requirements or good industry practice. Cross-cutting measures which are applicable to several impacts or phases are described in Table 8-1 (MiG #).The proposed mitigation measures applicable to specific project phases are described in Table 8-2 for pre-construction and construction phases (MiC #), and in Table 8-3 for commissioning, operation, and maintenance (MiO #). In addition, mitigation measures for specific impacts of the decommissioning phase are proposed in Table 8-4 (MiD #). These tables include details of the valued receptor affected, the assessed impacts, the significance before the application of mitigation measures, the proposed measures (including codes), those who are responsible, and the deadlines/periods for the completion of mitigation measures.

Table 8-1 Cross-cutting Mitigation measures for All Project Phases

Valued Receptor	Impact	Impact significance	Code	Mitigation Measure: Commissioning, Operation and Maintenance	Responsibility	Period
All VR	All impacts	All significance categories	MiG 1	Implement the Cabeolica Expansion Project Stakeholder Engagement Plan included in Appendix C, which includes the identification of stakeholders, the views of stakeholders on the SEP and the timing and methods of engagement with stakeholders throughout the life cycle of the project.	Cabeolica and EPC contractors	All phases
			MiG 2	Implement the Cabeolica Grievance Redress Mechanism (GRM) included in Appendix C to address potential grievances/concerns of interested third parties in a timely manner throughout the Project. All contractors will follow, and integrate proportionally, the Cabeolica GRM procedures, where relevant, into their Project environmental and social management plans and systems as per the SEP.	Cabeolica and EPC contractors	All phases
			MiG 3	Implement the Cabeolica Expansion Project Waste Management Plan (Doc. No. 06106-416041-47260-B-06-0029). Update responsibilities, procedures, and compliance actions as required.	Cabeolica and EPC contractors	All phases

Table 8-2 Mitigation measures for Pre-Construction and Construction

Valued Receptor		Impact	Impact Significance	Code	Mitigation Measure: Pre-construction and Construction	Responsibility	Period
PHYSICAL ENVIRONMENT	Global Climate & Air Quality	Decreased air quality and impact on climate change	COMPATIBLE	MiC 1	Use low-sulphur diesel (<1.5%) to reduce emissions.	EPC Contractor	During construction phase
				MiC 2	Ensure appropriate equipment and vehicles maintenance and avoid deficient combustion.	EPC Contractor	During construction phase
				MiC 3	Adopt a policy of switching off machinery and equipment when not in use.	EPC Contractor	During construction phase
				MiC 4	Minimise transportation on and to/from the site through efficient transport management to minimise noise and vehicle pollution.	EPC Contractor	During construction phase
				MiC 5	Suppress dust, where and when necessary, by spraying affected soil surfaces and piles of soil with water, fencing stockpiles, and minimizing discharge heights from trucks (not to exceed 1 m).	EPC Contractor	During construction phase
				MiC 6	Ensure that the transport of materials is done in suitable and covered vehicles in order to prevent the dispersion of dust.	EPC Contractor	During pre-construction and construction phase
	Acoustic Environment	Increased ambient noise levels	COMPATIBLE	MiC 7	Apply MiC 1-4 to minimize noise emissions.	EPC Contractor	During construction phase
				MiC 8	Combine and schedule noise-producing operations to occur during the same time period and avoid the night-time to prevent disturbance to nearby residents. When combined, verify that operations running at the same time are below applicable noise limits.	EPC Contractor	During construction phase
				MiC 9	Check that all site equipment is within the acceptable noise standards.	EPC Contractor	During construction phase
	Geology & soils	Soil loss, compaction and impacts on soil quality	COMPATIBLE	MiC 10	Mark locations of new access roads, temporary offices, and laydown areas before activities begin and avoid activities outside these defined areas.	EPC Contractor	During pre-construction phase
				MiC 11	Limit construction activities to demarcated areas and follow pre-defined transport routes.	EPC Contractor	During construction phase
				MiC 12	Preserve excavated soil for reuse, when possible, during site restoration activities.	EPC Contractor	During and after construction phase
		Demand of natural resources for construction materials	COMPATIBLE	MiC 13	Source construction materials locally, where feasible, and keep transport distance as short as possible.	EPC Contractor	During pre-construction and construction phase
				MiC 14	All fill materials will be sourced from existing licenced facilities. No fill material is to be imported from new locations opened for the project, unlicenced borrow pits or landfill sites	EPC Contractor	During pre-construction and construction phase
BIOLOGICAL ENVIRONMENT	Flora	Direct removal or damage to vegetation	COMPATIBLE	MiC 15	Apply MiC 11 to minimize damage to vegetation.	EPC Contractor	During construction phase
				MiC 16	Maintain the original condition of surface soils and vegetation cover to the extent practical during pre-construction and construction activities. Unnecessary removal of vegetation during construction should be avoided and surrounding vegetation must be protected by employing appropriate fences, covers, etc. If	EPC Contractor	During construction phase

Valued Receptor		Impact	Impact Significance	Code	Mitigation Measure: Pre-construction and Construction	Responsibility	Period
					applicable, an authorization for the removal of vegetation will be requested to *Direção Geral de Agricultura, Silvicultura e Pequária* (DGASP).		
				MiC 17	Use existing accesses and transport corridors whenever possible.	EPC Contractor	During pre-construction and construction phase
	Flora	Impact on flora due to the introduction of invasive flora alien species	COMPATIBLE	MiC 18	Check origin of equipment and materials used on site.	EPC Contractor	During pre-construction phase
				MiC 19	Implement invasive species management procedures, including cleaning of equipment, prior to shipping to site	EPC Contractor	During pre-construction phase
	Fauna	Impact on fauna due to habitat loss (reptiles and mammals)	COMPATIBLE	MiC 20	Apply MiC 15 - 17 to minimise habitat loss.	Cabeolica EPC Contractor	During pre-construction phase
				MiC 21	Before initiating construction activities, conduct an initial survey to confirm or exclude the presence of endemic reptiles species. If encountered, ensure that the maximum number of reptiles are removed, and relocated in another area with similar conditions to the original location. Restore habitats for reptiles by adding more refuges, such as piles of large rocks.	Cabeolica EPC Contractor	During pre-construction phase
		Impact on fauna due to the introduction of invasive fauna alien species (reptiles and mammals)	COMPATIBLE	MiC 22	Apply MiC 18 and MiC 19 to minimise the introduction of fauna invasive species.	EPC Contractor	During pre-construction phase
		Disturbance to fauna (reptiles, mammals and avifauna)	COMPATIBLE	MiC 23	Apply MiC 15 - 17 and MiC 20 - 21 to minimize disturbance to fauna.	Cabeolica EPC Contractor	During pre-construction and construction phase
				MiC 24	Design waste management procedures to prevent the attraction of fauna by appropriately managing food waste in work areas and in and around temporary offices.	EPC Contractor	During pre-construction phase
				MiC 25	Minimise the generation of light during the night-time to avoid attracting fauna and causing potential deviations from migration routes.	EPC Contractor	During construction phase
				MiC 26	Minimise the risk of injury to fauna from vehicle movements by adopting safe speed limits and driving only through pre-defined established access routes.	EPC Contractor	During construction phase
SOCIEONOMIC ENVIRONMENT	Population	Impact on local communities due to noise, dust, and air pollution	COMPATIBLE	MiC 27	Apply MiC 1-9 to minimise disturbance to population.	EPC Contractor	During construction phase
				MiC 28	Conduct environmental training and awareness activities for workers involved in the pre-construction and construction works.	Cabeolica EPC Contractor	During pre-construction and construction phase
		Impact on local communities due to influx of construction workers and job seekers	COMPATIBLE	MiC 29	Promote the use of a local workforce whenever possible and practicable to do so.	EPC Contractor	During pre-construction and construction phase
				MiC 30	Conduct training and awareness activities for workers involved in the pre-construction and construction works, including general norms for dealing with local population, general rules of hygiene health and safety (HHS) on construction site, gender based violence and risks and prevention of sexually transmitted diseases, among others (See training requirements in Appendix A ESMP).	Cabeolica EPC Contractor	During pre-construction and construction phase
				MiC 31	Implement Cabeolica's Labour Codes and Policies which are compliant with national legislation and are considered proportionate for the project: Code of Business Conduct, Ethic & Work Conduct, Anti-bribery and Anti-corruption Policy and Whistleblower Policy.	EPC Contractor	During pre-construction and construction phase
				MiC 32	Implement mechanisms to control and penalize situations related to gender-based discrimination, harassment, violence, sexual exploitation, and abuse of minors and other vulnerable communities.	EPC Contractor	During pre-construction and construction phase
	Local Economy	Creation of employment, skills development, and business opportunities	POSITIVE	MiC 33	Apply MiC 29 to increase benefits of social and economic aspects of the resident population in nearby communities.	EPC Contractor	During pre-construction and construction phase
				MiC 34	Establish a register for interested companies and individuals to assist in the identification of supply and support opportunities during the construction of the BESS components.	Cabeolica	During pre-construction phase

Valued Receptor		Impact	Impact Significance	Code	Mitigation Measure: Pre-construction and Construction	Responsibility	Period
	Infrastructure	Effects on local infrastructure due to increased traffic and waste generation	COMPATIBLE	MiC 35	Develop a logistics, traffic, and transportation plan that covers the transportation of heavy components using specialist transportation vehicles (if applicable).	Cabeolica EPC Contractor	During pre-construction phase
				MiC 36	Ensure that roads and accesses in the vicinity of project areas are not obstructed or in poor conditions.	Cabeolica	During pre-construction phase
	Landscape	Change on the visual perception of landscape	COMPATIBLE	MiC 37	Apply MiC 10-12 to minimize impacts on landscape.	EPC Contractor	During construction phase
				MiC 38	Conduct site restoration activities at the end of the construction phase.	EPC Contractor	After construction phase
	Cultural Heritage	Damage to cultural heritage resources	COMPATIBLE	MiC 39	Implement Cabeolica's chance finds procedure (See Appendix D) which shall be in place during the pre-construction and construction phase to manage any potential chance cultural heritage finds. All site workers, including EPC workers, will also undergo training in chance finds procedures.	Cabeolica EPC Contractor	During construction phase

Table 8-3 Mitigation measures for Commissioning. Operation and Maintenance Phase

Valued Receptor		Impact	Impact significance	Code	Mitigation Measure: Commissioning, Operation and Maintenance	Responsibility	Period
PHYSICAL ENVIRONMENT	Global Climate and Air Quality	Reduced CO_2 emissions by storage	POSITIVE	-	-		
		Decreased air quality and impact on climate change	COMPATIBLE	MiO 1	Apply MiC 1-4 to minimize air emissions during operation and maintenance activities.	Cabeolica and BESS provider	During operation
	Acoustic Environment	Increased ambient noise levels	COMPATIBLE	MiO 2	Apply MiC 7-9 to minimize noise emissions during operation and maintenance activities.	Cabeolica and BESS provider	During operation
				MiO 3	Install best available technology (BAT) compliant with noise emission standards and economically viable for the project.	Cabeolica and BESS provider	During pre-construction
BIOLOGICAL ENVIRONMENT	Fauna	Disturbance to fauna (avifauna, reptiles and mammals)	COMPATIBLE	MiO 4	Apply MiC 23-26 to reduce disturbance to fauna during operation and maintenance activities.	Cabeolica and BESS provider	During operation
SOCIOECONOMIC ENVIRONMENT	Population	Impact on local communities due to noise, generated dust, and air pollution	COMPATIBLE	MiO 5	Apply MiO 1 to MiO 3 to reduce disturbance to local communities during operation and maintenance activities.	Cabeolica and BESS provider	During operation
	Local Economy	Creation of employment, skills development, and business opportunities	POSITIVE	MiO 6	Apply MiC 33 ad MiC 34 to enhance the creation of employment, skills development, and business opportunities during operation.	Cabeolica and BESS provider	During operation
	Landscape	Change on the visual perception of landscape	COMPATIBLE	MiO 7	Minimise the presence of ancillary structures on the site by minimising site infrastructure.	Cabeolica and BESS provider	During pre-construction

Table 8-4 Mitigation measures for Decommissioning Phase (specific impacts)

Valued Receptor		Impact	Impact significance	Code	Mitigation Measure: Decommissioning	Responsibility	Period
PHYSICAL ENVIRONMENT	Global Climate and Air Quality	Impact on global climate due to SF_6 release	COMPATIBLE	MiD 1	Recycle SF_6 gas at equipment servicing or disposal at approved facilities.	Cabeolica and BESS provider	During operation
				MiD 2	Implement leak detection and repair strategies consistent with BAT and economically feasible for the Project	Cabeolica and BESS provider	During pre-construction phase and regularly during operation
				MiD 3	Appropriate decommissioning using SF_6 recovery systems. For closed-pressure systems, utilities can purify used SF_6 onsite or off-site or send non-reusable gas for destruction. Evacuate SF_6 from all equipment including hermetically sealed pressure equipment	Cabeolica and BESS provider	During decommissioning phase
SOCIOECONOMIC ENVIRONMENT	Infrastructure	Impact on waste management infrastructure due to waste generation	COMPATIBLE	MiD 4	Update the Cabeolica Expansion Project Waste Management Plan prior to starting this phase to guarantee compliance with the applicable regulations at the time of starting these activities and to allow for the identification of available final disposal/recycling facilities	Cabeolica	Before the start of the decommissioning phase

8.1.2 Mitigation measures for Non-Routine events

Designing appropriate prevention and response strategies to address predicted impacts from non-routine operations is an important component of best practices and critical for meeting regulatory requirements. General environmental recommendations (MiN #) to prevent and mitigate impacts resulting from non-routine operations are listed in Table 8-5.

Table 8-5 Mitigation measures for non-routine events

Non-routine event	Code	Mitigation Measures: Non-Routine Events	Responsiblility	Period
All non-routine events	MiN 1	Develop and implement an Emergency Response Plan (ERP) and a Health and Safety Plan (HSP) for all facilities.	EPC Contractor Cabeolica	During all phases of the project
	MiN 2	Document and report each non-routine event and accident that occurs. Cabeolica to notify lenders no later than 72 hours after the occurrence of non-routine event or accident. In the event of a severe EOHS risk or incident works will be suspended and only should be resumed upon no-objection of the Lenders. A root-cause analysis (RCA) of any fatal EOHS incident shall be prepared along with a Corrective Action Plan (CAP).	EPC Contractor Cabeolica	During all phases of the project
	MiN 3	Implement the Cabeolica Grievance Mechanism to address potential grievances/concerns of interested third parties in a timely manner throughout the implementation of the Project. All contractors will follow, and integrate proportionally, the Cabeolica GRM procedures, where relevant, into their Project environmental and social management plans and systems.	EPC Contractor Cabeolica	During all phases of the project
	MiN 4	Address any complaint received from the local community and onsite workers promptly to the extent practical.	EPC Contractor Cabeolica	During all phases of the project
	MiN 5	Maintain good housekeeping at all times.	EPC Contractor Cabeolica	During all phases of the project
	MiN 6	Clearly display Material Safety Datasheets (MSDS) and safety instructions in the storage area.	EPC Contractor Cabeolica	During all phases of the project
	MiN 7	Implement the Cabeolica and EPC contractor training programmes as given in the E&S Manual and EPC contract to ensure that personnel onsite respond in a timely manner to accidents, incidents and in the event of an emergency.	EPC Contractor Cabeolica	During all phases of the project
	MiN 8	Ensure that emergency alarm systems are both audible and visible, where applicable to GIIP and national legislation	EPC Contractor Cabeolica	During all phases of the project
	MiN 9	Ensure that appropriately equipped first-aid stations are easily accessible throughout the site.	EPC Contractor Cabeolica	During all phases of the project
Fire and explosion accidents	MiN 10	Ensure regular inspection and maintenance of electrical equipment and fittings to avoid the risk of fire, as per Cabeolica Health, Safety and Environment (HSE) plan.	EPC Contractor Cabeolica	During all phases of the project
	MiN 11	Ensure that fire response equipment is routinely inspected, maintained, and operationally exercised and tested, and is available as necessary for response.	EPC Contractor Cabeolica	During all phases of the project
	MiN 12	Coordinate with local fire services and provide specific information about the facility, as necessary, so that the most effective firefighting methods can be determined and mobilised.	Cabeolica	During all phases of the project
	MiN 13	Install circuit breakers in the power supply for equipment to prevent excessive current flow and hazards due to possible short-circuiting.	EPC Contractor Cabeolica	During all phases of the project
	MiN 14	Train and familiarise employees involved in electrical works with the safety-related work practices, safety procedures, and other safety requirements related to their respective job assignments.	EPC Contractor Cabeolica	During all phases of the project
	MiN 15	Provide fire and explosion protection, suppression, and relief equipment, and suitable personal protective equipment (PPE).	EPC Contractor Cabeolica	During all phases of the project
	MiN 16	Implement best practices for mitigating BESS hazards, which may include the following: Hazard Mitigation Analysis (HMA); Smoke and fire detection; Fire control and suppression; Explosion control; Gas detection; Thermal runaway protection; Size and separation requirements; Water supply; Explosion prevention systems; and Deflagration venting.	BESS provider	During all phases of the project
Accidents / Collision of vehicles	MiN 17	Ensure driver safety training is provided and verify driver qualifications.	EPC Contractor	During construction phase
	MiN 18	Ensure that traffic plan is appropriate to cover all transport arrangements.	EPC Contractor	During construction phase
	MiN 19	Movement of vehicles shall be restricted to the identified routes.	EPC Contractor	During construction phase
Leaks and spills of hazardous substances and waste	MiN 20	Subject vehicles and other equipment to regular maintenance and inspections to prevent fuel and lubricant spills and leaks.	EPC Contractor Cabeolica	During all phases of the project
	MiN 21	Ensure that spill response and containment equipment are routinely inspected, maintained, and operationally exercised and tested, and are available as necessary for response.	EPC Contractor Cabeolica	During all phases of the project
	MiN 22	Pave and make impervious all storage areas for oil, cement, and other materials, with secondary containment and a spill kit.	EPC Contractor Cabeolica	During all phases of the project
	MiN 23	Use appropriate containers and receipts according to the type of hazardous substances or waste to be stored.	EPC Contractor Cabeolica	During all phases of the project
	MiN 24	Store hazardous substances and waste in a defined space and that is accessible to only authorized personnel.	EPC Contractor Cabeolica	During all phases of the project
	MiN 25	Contain spills as quickly as possible and immediately begin clean-up using appropriate clean-up materials.	EPC Contractor Cabeolica	During all phases of the project

Non-routine event	Code	Mitigation Measures: Non-Routine Events	Responsiblility	Period
	MiN 26	Document and report each leak and spill event.	EPC Contractor Cabeolica	During all phases of the project
	MiN 27	Implement Cabeolica Expansion Project Waste Management Plan (WMP) (Doc. No. 06106-416041-47260-B-06-0029).	EPC Contractor Cabeolica	During all phases of the project
	MiN 28	Use an environmental register to record all waste management activities, including quantities and types of waste handled.	EPC Contractor Cabeolica	During all phases of the project
Occurrence of flash floods	MiN 29	Design site drainage (during construction, and then for the operational stage) to account for the likely Storm Event Intensity for the area.	EPC Contractor	During pre-construction phase
	MiN 30	Alignment with Cabo Verde Emergency Preparedness and Response Plan	Cabeolica	During all phases of the project

8.2 Monitoring Plan

The Monitoring Plan defines the actions to be carried out prior to and/or during project activities to verify the effective implementation of mitigation measures and the compliance of impacts from activities within acceptable limits. Additionally, this plan provides early warnings of potential impacts, informs future operations, and contributes to continuous improvement in the management of environmental and social issues related to the Project. The monitoring activities proposed for those cross-cutting mitigation measures applicable to all project phases are summarized in Table 8-6. Specific monitoring activities for each phase and those applicable to non-routine events are summarized in Table 8-7 to Table 8-10. Under the supervision of Cabeolica's MESA, this table includes details of the valued receptors subject to monitoring, the proposed measures, the monitoring frequencies, and those responsible.

Table 8-6 Monitoring activities for Cross-cutting mitigation measures applicable to all phases.

Valued Receptor	Impact	Mitigation measure	Monitoring Measure	Monitoring Location(s)	Indicator	Evidence	Monitoring Frequency	Responsibility
All	All impacts	MiG 1	MoG 1 Verification of Cabeolica Expansion Project SEP implementation during subsequent phases.	-	**Meetings:** No. of meetings held. **Communication materials:** No. of communication materials produced and disseminated. **Use of social media platforms:** No. of social media messages published/No. of reactions to messages in social media. **Training of internal stakeholders on SEP**: No. of training sessions and hours of training.	List of participants in each meeting. Pictures of the event. Attendance register. List of comments raised during the meetings. Communication material. Evidence of publication in social media platforms. List of participants in each training session.	Continuous through construction activities and regular follow up during remaining phases	Cabeolica (MESA) EPC Contractor (HSE Manager)
	All impacts	MiG 2 MiN 3 MiN 4	MoG 2 Verification of Cabeolica GRM implementation. Register and address, in a timely manner, the complaints received from local community and onsite workers	-	No. of close-out complaints are equal to No. of complaints received.	Grievance forms. Grievance register.	Continuous through construction activities and regular follow up during remaining phases	EPC Contractor (HSE Manager) Cabeolica (MESA)
	All impacts	MiG 3 MiN 27 MiN 28	MoG 3 Verification of Cabeolica Expansion Project WMP implementation	-	Quantities of waste (hazardous and non-hazardous) stored per month. Quantities of waste (hazardous and non-hazardous) delivered per month (if any) and management operation to which they were subjected.	Waste data tracking. HSE inspections records.	Continuous through construction activities and regular follow up during remaining phases	EPC Contractor (HSE Manager) Cabeolica (MESA)

Table 8-7 Monitoring activities during Pre-construction and Construction.

Valued Receptor	Impact	Mitigation measure	Monitoring Measure	Monitoring Location(s)	Indicator	Evidence	Monitoring Frequency	Responsibility
Air Quality	Decreased air quality and impact on climate change	MiC 1	MoC 1 Verify that low-sulphur diesel (<1.5%) is used to reduce emissions	-	Fuel consumption (m^3) and type of fuel	Fuel specification. Fuel consumption register.	Monthly during construction	EPC Contractor (HSE Manager)
		MiC 2	MoC 2 Verify appropriate equipment and vehicles operation and maintenance	-	Percentage (%) of vehicles/machinery serviced as per maintenance procedures	Equipment and vehicles maintenance/inspection records	Monthly during construction	EPC Contractor (HSE Manager)
		MiC 4	MoC 3 Verify that Logistic, Traffic and Transportation Plan to limit transport to essential travel is in place and is followed	-	Daily number of transportation trucks moving in and out of the site not exceeding estimates included under the plan. Routes followed vs planned.	Register of signing in and out of trucks at security gate.	Monthly during construction	EPC Contractor (HSE Manager)
		MiC 3 MiC 5 MiC 6	MoC 4 Verify dust / combustion pollutants reduction strategies	Site construction areas and access roads	Volume of water used for irrigation (m^3). Percentage (%) of vehicles/machinery serviced as per maintenance procedures.	Irrigation records. Equipment and vehicles maintenance/inspection records.	Daily during construction	EPC Contractor (HSE Manager)

Valued Receptor	Impact	Mitigation measure	Monitoring Measure	Monitoring Location(s)	Indicator	Evidence	Monitoring Frequency	Responsibility
Acoustic Environment	Increased ambient noise levels	MiC 7 MiC 9	MoC 5 Verify that all site equipment is within acceptable noise standards	-	Percentage (%) of vehicles/machinery serviced as per maintenance procedures.	Equipment and vehicles maintenance/inspection records.	Monthly during construction	EPC Contractor (HSE Manager)
		MiO2	MoC 6 Verify that BAT compliant with noise emissions standards and economically viable for the project is adopted in final BESS design	-	Number and type of BAT adopted in final BESS design compliant with noise emissions standards.	Final design.	Once during pre-construction, with final design	Cabeolica, and BESS Provider
Soil, Flora and Fauna	Soil loss, compaction and impacts on soil quality Direct removal or damage to vegetation	MiC 10 MiC 11 MiC 15 MiC 17	MoC 7 Periodic verification that areas used for construction activities are restricted to the areas delimited for this purpose	Site construction areas and access roads	Surface of areas occupied during construction vs planned	HSE inspection records Photographic records	Weekly during construction	EPC Contractor (HSE Manager)
		MiC 12 MiC 16	MoC 8 Verify that excavated soil is preserved for reuse during restoration activities, when possible	Site construction areas and access roads	Volume of soil excavated vs volume of soil used for restoration activities.	HSE inspection records. Photographic records.	Daily during site preparation activities and once after restoration activities	EPC Contractor (HSE Manager)
		MiC 16	MoC 9 Verify that, when applicable, authorization for the removal of vegetation is requested to *Direção Geral de Agricultura, Silvicultura e Pequária* (DGASP).	Site construction areas and access roads	Number of permits obtained in accordance with legal requirements	Permits obtained (when applicable)	Once, before construction activities	EPC Contractor (HSE Manager)
	Impact on fauna due to habitat loss	MiC 21	MoC 10 Verify that an initial site survey to identify areas of high concentration of fauna individuals (including photographic survey of sites where components will be installed) is conducted before initiating construction activities	Site construction areas and access roads	Number and type of sensitive species affected. Number of permits obtained in accordance with legal requirements.	GPS location and photographic records of areas where final components will be located. GPS location of species to be removed. Permits obtained (where applicable).	Once, before construction activities	Cabeolica (MESA)
		MiC 21	MoC 11 Verification of removal of species categorized as Endangered or Critically Endangered Species by the IUCN Red List and endemic species (where applicable)	Site construction areas and access roads				Cabeolica (MESA) EPC Contractor (HSE Manager)
		MiC 21	MoC 12 Verification of relocation of fauna species where important concentrations have been observed (where applicable), and sensitive species are affected.	Site construction areas and access roads	Number of sensitive species relocated and destination (where applicable) (per specie)	HSE inspections records Photographic records	Once before construction	Cabeolica (MESA) EPC Contractor (HSE Manager)
		MiC 21	MoC 13 Verification of site restoration measures of areas affected by construction activities	Site construction areas and access roads	Surface of areas restored vs planned.	HSE inspection records. Photographic records.	Once, at the end of construction	Cabeolica (MESA) EPC Contractor (HSE Manager)
	Disturbance to fauna	MiC 24	MoC 14 Verify that all waste on site will be correctly stored and disposed off-site and that no edible waste (e.g. remains of animal carcasses, bones etc.) will be left on site during construction.	Site construction areas and access roads	Number of complaints or warning notices issued by HSE Manager	Warning notices issued	Daily during construction activities	EPC Contractor (HSE Manager)
		MiC 25	MoC 15 Verify that light during nighttime is minimized to avoid fauna attraction	Site construction areas	Lux levels used during night in compliance with final design and legislation	HSE inspections records	Once, before the start of construction	EPC Contractor (HSE Manager)
		MiC 26	MoC 16 Verify implementation of safe speed limits and driving through pre-defined routs	Site construction areas and access roads	Number of wildlife collisions	HSE inspection records	Daily during construction activities	EPC Contractor (HSE Manager)

Valued Receptor	Impact	Mitigation measure	Monitoring Measure	Monitoring Location(s)	Indicator	Evidence	Monitoring Frequency	Responsibility
	Impact on flora and fauna due to the introduction of invasive flora and fauna alien species	MiC 18 MiC 19 MiC 22	MoC 17 Check origin of equipment and very cleaning of materials used on site to prevent the introduction of alien species	-	Percentage (%) of vehicles/machinery cleaned as per invasive flora and fauna prevention procedures.	HSE inspections records	Every time new equipment or machinery is brought to site	EPC Contractor (HSE Manager)
Demand of project resources	Demand of natural resources for construction materials	MiC 13 MiC 14	MoC 18 Register sources and quantities of water, raw materials and power requirements	-	Quantities and sources of origin of natural resources used during construction	Record of natural resources consumption Record of construction material	Monthly	EPC Contractor (HSE Manager)
Population/ Local Economy	Impact on local communities due to: - noise, dust, and air pollution - influx of construction workers and job seekers	MiC 28 MiC 30	MoC 19 Register training and awareness activities for workers	-	Number of workers participating in minimum one training and awareness session Training hours recorded.	Training matrix Training schedule Lists of participants	Once before construction and every time new workers are admitted	Cabeolica (MESA) EPC Contractor (HSE Manager)
		MiC 31 MiC 32	MoC 20 Verify implementation of Cabeolica's Labour Codes and Policies and that mechanisms to penalize situations related to gender-based discrimination, harassment, violence, sexual exploitation, and abuse of minors and other vulnerable communities are in place	-	No. of close-out complaints related to non-compliance with Labour Codes and Policies are equal to No. of complaints received.	EPC contract, policies and CCESMP. Cabeolica Labour Codes and Policies. Grievance register.	Once before pre-construction	Cabeolica (MESA) EPC Contractor (HSE Manager)
	Creation of employment, skills development, and business opportunities	MiC 29 MiC 33	MoC 21 Register employment created by the Company (direct and indirect) and verify that the use of local workforce is promoted when practicable to do so	-	Number of jobs created, gender ratio, and local employee ratio.	Employment records.	Monthly	Cabeolica (MESA) EPC Contractor (HSE Manager)
		MiC 34	MoC 22 Verify that a register of interested companies and individuals is created to supply and support opportunities during construction	-	Number of companies and individuals identified, gender ratio and local employee ratio	Company Register.	Once, before construction	Cabeolica (MESA)
Infrastructure	Effects on local infrastructure due to increased traffic	MiC 35	MoC 23 Verify that a logistics, traffic and transportation plan is developed (when applicable)	-	Daily number of transportation trucks moving in and out of the site not exceeding estimates included under the plan. Routes followed vs planned.	Register of signing in and out of trucks at security gate	Once, before construction	Cabeolica (MESA) EPC Contractor (HSE Manager)
		MiC 36	MoC 24 Verification that roads and accesses in the vicinity of project areas are not obstructed or are in poor conditions	Access roads	Number of incidents or close-out complaints received related to road and access conditions are equal to No. of complaints received	HSE inspections records Photographic record.	Weekly	EPC Contractor (HSE Manager)
Landscape	Change on the visual perception of landscape	MiC 38 MiO 7	MoC 25 Verification of site restoration measures and landscape integration work	Site construction areas and access roads	Surface of areas restored vs planned.	Final design Photographic record	Once during pre-construction, with final design Once, at the end of construction	EPC Contractor (HSE Manager)
Cultural Heritage	Damage to cultural heritage resources	MiC 39	MoC 26 Verify implementation of Cabeolica's chance finds procedure	Site construction areas and access roads	Number of chance finds identified and actions taken (where applicable)	Report of findings and actions taken (where applicable)	Daily during earthworks works	Cabeolica (MESA) EPC Contractor (HSE Manager)

Table 8-8 Monitoring activities during Operation

Valued Receptor	Impact	Mitigation measure	Monitoring Measure	Monitoring Location(s)	Indicator	Evidence	Monitoring Frequency	Responsibility for monitoring
Air Quality	Decreased air quality and impact on climate change	MiO 1	MoO 1 Verify that low-sulphur diesel (<1.5%) is used to reduce emissions.	BESS site area	Fuel consumption (m^3) and type	Fuel specification. Fuel consumption register	During maintenance operations	Cabeolica (MESA), Vestas and BESS provider
			MoO 2 Verify appropriate equipment and vehicles operation and maintenance	BESS site area	Percentage (%) of vehicles/machinery serviced as per maintenance procedures	Equipment and vehicles maintenance/inspections records	During maintenance operations	Cabeolica (MESA), Vestas and BESS provider
			MoO 3 Verify that machinery and equipment is switched-of when not in use.	BESS site area	Number of complaints or warning notices issues by HSE Manager	Warning notices issued	During maintenance operations	Cabeolica (MESA), Vestas and BESS provider
		MiD 1 MiD 2	MoO 4 Verify that SF_6 gas leak detection and repair strategies are implemented and that gas is recycled or disposed at approved facilities.	-	Percentage (%) of equipment serviced as per maintenance procedures. Quantities and type of gas recovered during the operation phase.	Records including information on: i) Quantity and type of gas in equipment when installed. ii) Quantity and type of gas added during maintenance. iii) Dates and results of mandatory leak checks. iv) Registered waste carrier used to dispose gas.	During maintenance operations	Cabeolica (MESA), Vestas and BESS provider
Acoustic Environment	Increased ambient noise levels (BESS and general O&M activities)	MiO 3	MoO 5 Verify appropriate equipment and vehicles operation and maintenance	BESS site area	Percentage (%) of equipment and vehicles serviced as per maintenance procedures	Equipment and vehicles maintenance/inspection records	During maintenance operations	Cabeolica (MESA), Vestas and BESS provider
Fauna	Disturbance to fauna	MiO 4	MoO 6 Verify that light during nighttime is minimized to avoid fauna attraction	BESS site area	Lux levels used during night in compliance with final design and legislation	HSE inspections records	Regular follow-up during this phase	Cabeolica (MESA)
			MoO 7 Verify that all waste on site is correctly stored and disposed off-site and that no edible waste (e.g. remains of animal carcasses, bones etc.) will be left on site during construction.	BESS site area	Number of complaints or warning notices issues by HSE Manager	Warning notices issued	Regular follow-up during this phase	Cabeolica (MESA)
Population and Local Economy	Creation of employment, skills development, and business opportunities	MiO 6	MoO 8 Register employment created by the Company (direct and indirect) and verify that the use of local workforce is promoted when practicable to do so	-	Number of jobs created, gender ratio, and local employee ratio.	Employment records Annual Monitoring report	As part of Annual Windfarm monitoring	Cabeolica (MESA)

Table 8-9 Monitoring activities during Decomissioning

Valued Receptor	Impact	Mitigation measure	Monitoring Measure	Monitoring Location(s)	Indicator	Evidence	Monitoring Frequency	Responsibility for monitoring
Air Quality	Impact on global climate due to SF_6 release	MiD 3	MoD 1 Verify that appropriate SF6 gas recovering systems are used during this phase	-	Quantities and type of gas recovered during this phase.	Records of waste carrier used to dispose the gas.	Once during decommissioning	Cabeolica (MESA), Vestas and BESS provider
Infrastructure	Impact on waste management infrastructure due to waste generation	MiD 4	MoO 4 Verify that the Cabeolica Expansion Project Waste Management Plan is updated.	-	Quantities of waste (hazardous and non-hazardous) stored per month. Quantities of waste (hazardous and non-hazardous) delivered per month (if any) and management operation to which they were subjected.	Production of updated plan.	Once, before the start of the decommissioning phase.	Cabeolica (MESA), Vestas and BESS provider

Table 8-10 Monitoring activities for non-routine events

Non-routine event	Mitigation measure	Monitoring Measure	Indicator	Evidence	Monitoring Frequency	Responsibility for monitoring
All non-routine events	MiN 1	MoN 1 Verification of ERP and HSE plans preparation and implementation	-	ERP and HSE Plans in place and adhered to.	Once before each phase and regular follow-up during all phases	EPC Contractor (HSE Manager) Cabeolica (MESA)
	MiN 2	MoN 2 Verification of record of incidents	Number and types of emergency and non-routine situations.	Report of incidents and actions taken (where applicable)	Continuous during all phases	EPC Contractor (HSE Manager) Cabeolica (MESA)
	MiN 5	MoN 3 Verify that good housekeeping is kept at all times	Number of observations and non-conformances identified	HSE inspection records Photographic records	Continuous during all phases	EPC Contractor (HSE Manager) Cabeolica (MESA)
	MiN 6	MoN 4 Verify that MSDS and safety instructions are clearly displayed in the storage areas	Number and type of MSDS displayed are equal to number and type of hazardous materials stored	HSE inspection records Photographic records	Once before each phase and regular follow-up during all phases	EPC Contractor (HSE Manager) Cabeolica (MESA)
	MiN 7 MiN 14 MiN 17	MoN 5 Verify that Cabeolica and EPC contractor training systems are implemented to ensure that onsite personnel are familiarized with safety requirements related to their respective job assignments and respond in a timely manner to accidents, incidents and in case of emergency.	Number of workers participating in training and awareness sessions and training hours dedicated.	Training matrix Training schedule List of trainees	Once before each phase and every time new workers are admitted	EPC Contractor (HSE Manager) Cabeolica (MESA)
	MiN 8 MiN 9	MoN 6 Verify that emergency alarm systems, where applicable, are both audible and visible and that appropriately equipped first aid stations are accessible through the site.	Percentage (%) of emergency alarm systems displayed and serviced as per maintenance procedures. No. of drills.	HSE inspection records Photographic records Maintenance records	Once before each phase and regular follow-up during all phases	EPC Contractor (HSE Manager) Cabeolica (MESA)
	MiN 11 MiN 21	MoN 7 Verify that fire response and spill response equipment are routinely inspected, maintained, and operationally exercised and tested, and is available as necessary for response.	Percentage (%) of fire response and spill response equipment serviced and inspected as per maintenance procedures. No of drills.	HSE inspection records Photographic records Maintenance records	Once before each phase and regular follow-up during all phases	EPC Contractor (HSE Manager) Cabeolica (MESA)

Non-routine event	Mitigation measure	Monitoring Measure	Indicator	Evidence	Monitoring Frequency	Responsibility for monitoring
Fire and explosion accidents	MiN 10 MiN 13	MoN 8 Verify regular inspection and maintenance of electrical equipment and installation of circuit breakers in the power supply to avoid risk of fire.	Percentage (%) of circuit breakers installed and serviced as per maintenance procedures	HSE inspection records Photographic records Maintenance records	Once before each phase and regular follow-up during all phases	EPC Contractor (HSE Manager) Cabeolica (MESA)
	MiN 12	MoN 9 Check that specific information about the facility is provided to local fire services to coordinate the rapid response	Number of communications / meetings held with local fire services	Evidence of communication	Once before operation	Cabeolica (MESA)
	MiN 15	MoN 10 Verify that fire and explosion protection, suppression and relief equipment, and PPE required per the job titles are provided and regularly inspected	Percentage (%) of PEE procured and being used by workers.	PPE register Maintenance records Inspections records	Once before each phase and regular follow-up during all phases	EPC Contractor (HSE Manager)
	MiN 16	MoN 11 Verify that best practices for mitigating BESS hazards are adopted in the final design	Number and type of BAT adopted for mitigation BESS hazards	Final design	Once during pre-construction, with final design	BESS provider
Accidents / Collision of vehicles	MiN 17	MoN 12 Verify drivers qualifications	Number of drivers and qualifications No drivers attending driver safety training	Drivers' license Training records	Once before construction and every time new drivers are admitted	EPC Contractor (HSE Manager)
	MiN 18 MiN 19	MoN 13 Verify that Logistic, Traffic and Transportation Plan is followed	Number of accidents or collisions Routes followed vs planned	Register of signing in and out of trucks at security gate. Incident reports.	Once before construction phase and monthly follow-up during this phase	EPC Contractor (HSE Manager)
Leaks and spills of hazardous substances and wastes	MiN 20	MoN 14 Verify regular maintenance and inspections to vehicles and other equipment to prevent fuel and lubricant spills and leaks	Percentage (%) of vehicles/machinery serviced and inspected as per maintenance procedures	Equipment and vehicles maintenance/inspection records	Once before each phase and regular follow-up during this phase	EPC Contractor (HSE Manager) Cabeolica (MESA)
	MiN 22	MoN 15 Verify that storage areas and containers are properly equipped with paved areas, secondary containment and a spill kit	Number of observations and non-conformances identified	HSE inspection records Photographic records	Once before each phase and regular follow-up during this phase	EPC Contractor (HSE Manager) Cabeolica (MESA)
	MiN 23 MiN 24	MoN 16 Verify that appropriate containers and receipts are used according to the type of hazardous substance or waste and that these are stored in a defined space only accessible to authorized personnel	Number of observations and non-conformances identified	HSE inspection records Photographic records	Once before each phase and regular follow-up during this phase	EPC Contractor (HSE Manager) Cabeolica (MESA)
	MiN 25 MiN 26	MoN 17 In case of a leak or spill, verify that the incident is documented and that appropriate clean-up measures were adopted	Number and types of emergency and non-routine situations.	Report of incidents and actions taken (where applicable)	In case of leak or spill event	EPC Contractor (HSE Manager) Cabeolica (MESA)
Occurrence of flash floods	MiN 29	MoN 19 Verify that the Storm Event Intensity for the area has been considered in the design of site drainage	Parameters used in the design of site drainage	Final design	Once during pre-construction, with final design	EPC Contractor (HSE Manager)
	MiN 30	MoN 20 Verify that ERP is aligned with Cabo Verde Emergency Preparedness and Response Plans	Inclusion of measures to prevent the consequences of flash floods	ERP plan	Once before construction	Cabeolica (MESA) EPC Contractor (HSE Manager)

During the operation phase, monitoring activities of the new BESS components will be integrated into the current monitoring activities conducted by Cabeolica. The current scope includes **an annual environmental and social monitoring report** to be submitted to *Direção Nacional do Ambiente* with a compiled summary of the environmental and social activities executed throughout the year at the four windfarms, including the following activities:

- Verification of environmental mitigation measures and recovery: Monthly site visits to monitor compliance with the above KPIs for the following aspects by the site manager. The following aspects are monitored during this verification:
  - Review of disturbed vegetation and soils in the a. on the site and any disturbed areas arising from its construction adjacent to the site perimeter.
  - Biodiversity: Monitoring of recuperation of habitats on site and any disturbed areas arising from its construction, adjacent to the site perimeter.
  - Soil erosion: Monitoring soil erosion occurrence and checking the condition of drainage systems, including verification that drainage systems are not obstructed.
- Waste Production: Monitoring of hazardous and non-hazardous waste production and storage.
- Social Aspects: Monitoring of social measures implemented:
  - Job creation: Permanent, long-term, and temporary contracts.
  - Corporate social responsibilities and community activities: Contributions to social and economic development of local communities.
  - Development of relationships with local organizations in environmental education.
- Economic Aspects: Monitoring of socio-economic benefits related to wind energy production and energy storage.

Monitoring activities during the decommissioning phase will be similar to those proposed for pre-construction and construction and will be incorporated into the Decommissioning Plan for the Project.

9 Residual Impacts

The implementation of the mitigation measures described in Section 8 will reduce the impacts to residual impacts of lower significance.

There is not any anticipated residual impact for routine operations of the Component 4 of Cabeolica Expansion Project. As for residual impacts from non-routine events (Major accidents and Natural disasters), these were assessed following a risk assessment process and focusing on accident scenarios with only environmental or socioeconomic consequences, as discussed in Section 7.2. Prevention and mitigation measures identified through the risk assessment under each non-routine scenario would reduce the likelihood (frequency) and the environmental and social consequences should they occur. Assuming the implementation of those measures, all risk scenarios were reduced to MINOR and MODERATE to As Low As Reasonably Practicable (ALARP), as listed Table 7-13.

10 Conclusions

The present Simplified ESIA was designed and updated to comply with Cabo Verde legislation and International Agreements, and to meet the Lenders Requirements of the European Investment Bank (EIB) Environmental and Social Standards (2022) and the African Development Bank (AfDB) Operational Safeguards (2023), in response to the findings of the Lenders due diligence and site visits in the first half of 2024.

The analysis of the project activities, the associated environmental and social aspects, and the baseline environmental conditions were used to identify positive and negative impacts that would likely occur due to Routine Operations of the Cabeolica Expansion Project in São Vicente. The significance of each routine impact was assessed considering the value of the potential receptors in the study area and the magnitude of the impact in terms of various factors, such as intensity, extent, duration, and reversibility.

The simplified ESIA was prepared based on desktop information and complemented with information gather in the previous ESIA *Implementation of Battery Energy Storage Systems projects, São Vicente and Boa Vista islands* prepared by the company FUTURE Proman, S.A in 2021 and which included a site visit conducted in August 2021.

Furthermore, a stakeholder engagement meeting was carried out in Mindelo to introduce Cabeolica and the Project to stakeholders and to provide all available information about the Project with an overview of the environmental and social impacts and the mitigation measures proposed. Stakeholders were invited to participate in the Public Participation process. The main topics were related to the expected methodology to be followed to manage waste (batteries and used oils), and other topics related with the fulfilment of applicable legal requirements. NGO representatives asked about confirming the necessity to hire a specialized team for tasks related to the relocation of fauna species during construction activities, and the concerns of an Electra representative were about the economic benefits of the project for the electricity consumer. All the issues and concerns that were raised are addressed in Section 5.

The Cabeolica Expansion Project at São Vicente will have overall limited levels of environmental and social impacts with a COMPATIBLE value for which the implementation of mitigation measures will further lower or eliminate the significance of impacts . Non-routine (major accidents and natural disasters) impacts were assessed, and their residual impacts were assessed following a risk assessment process. Assuming the implementation of proposed mitigation measures, the significance of all risk scenarios will be reduced to ALARP (As Low As Reasonably Practicable).

The main anticipated impacts due to the Project will be minimised by implementing the proposed mitigation measures, which will be accomplished and monitored through the Environmental and Social Management Plan (ESMP).

The present Simplified ESIA accounts for the potential, relevant and significant impacts of the BESS facility and, in accordance with GIIP, the level of assessment presented is proportionate and limited to the potential impacts and risks identified along the process of the BESS installation, operation and decommissioning.

11 References

11.1 Bibliography

- Advisian, Decommissioning assessment study - Santiago, Sal, Boa Vista and São Vicente Project Decommission, Cabo Verde, Doc. No. 416041-47260-B-06-0008, Rev. C.
- Advisian, Lifetime Assessment Study – Santiago, Sal, Boa Vista and São Vicente Project Lifetime Extension Analysis, Cabo Verde, Doc. No. 416041-47260-B-06-0006, Rev. A.
- AfDB & Republic of Cabo Verde, Cabo Verde Country Strategy Paper, 2019-2024 Mid- Term review and country portfolio performance review, April 2024.
- Baptista, I., Fleskens L., Ritsema C., Querido A., Tavares J., Ferreira A.D., Reis E.A., Gomes S., Varela A.., Soil and water conservation strategies in Cabo Verde and their impacts on livelihoods: an overview from the Ribeira Seca watershed, 2015, *4*(1), 22-44; https://doi.org/10.3390/land4010022.
- Cabeolica, Annual Monitoring Report 2021, January 2022.
- Cabeolica, Annual Monitoring Report 2022, January 2023.
- Cabeolica, Annual Monitoring Report 2022, January 2024.
- Cabo Verde – Main details about biodiversity facts. Status and trends of biodiversity, including benefits from biodiversity and ecosystem services. www.cbd.int
- CBD Fifth National Report – Cabo Verde (English version): https://www.cbd.int/doc/world/cv/cv-nr-05-en.pdf
- Climate Change Knowledge Portal for Development Practitioners and Policy Makers: https://climateknowledgeportal.worldbank.org/country/Cabo-verde/climate-data-historical
- Conesa, Guía metodológica para la evaluación del impacto ambiental, 2010.
- Conzen *et al.*, Lithium-ion battery energy storage systems (BESS) hazards. Journal of Loss Prevention in the Process Industries, Volume 81, 2023.
- Defra, Update of noise data base for prediction of noise on construction and open sites, 2005.
- DNA, Categorizaçao Ambiental BESS – São Vicente, June 2023.
- Future Proman, ESIA for the Implementation of BESS projects, São Vicente and Boa Vista islands, 2021.
- Gabinete de Advocacia, Consultoria e Procuradora Jurídica, Environmental Impact Assessment, Complete Report, Feb 2009.
- Governo de Cabo Verde, Regional Spatial Planning Scheme for São Vicente Island, 2011.
- Governo de Cabo Verde – Ministry of Industry, Trade and Energy. Request for Proposal. Procurement process for an Independent Storage Provider for BESS in Lazaretto, São Vicente Island, and BESS in Parcela, Boa Vista Island, Cabo Verde, August 2023.
- Governo de Cabo Verde. SDG Cabo Verde. Voluntary National Report on the Implementation of the 2030 Agenda for Sustainable Development. June 2018.
- Hansen and Sunding, Flora of Maracorenia. Checklis of vascular plants, 4, revised edition, Sommerfeltia, 1993.

- Hazevoet, C.J. (1996). *Lista Vermelha para as aves que nidificam em Cabo Verde. Courier Forschungsinstitut Senckenberg* (CFS), 193, p. 127-135.
- Hazevoet, C. J. & Masseti, M., "On the history of the green monkey Chlorocebus sabaeus (L., 1766) in the Cabo Verde islands, with notes on other introduced mammals, Zoologia Caboverdiana 2 (1): 12-24, January 2011.
- INE Cabo Verde, *Anuário Estatístico*, 2020.
- INE Cabo Verde. *Anuário Estatístico* 2022.
- INE Cabo Verde. *Condiçoes de vida dos agregados familiares* 2022.
- INE Cabo Verde. *Estatísticas das familias e condices de vida. Inquérito Multi-Objetivo Contínuo* 2019.
- INE Cabo Verde. *Estatísticas do Ambiente*, 2016.
- INE Cabo Verde. *Estatísticas Vitais. Nascimentos, óbitos e casamentos* 2021.
- INE Cabo Verde. *Projeções demográficas da população por concelho e idade* simples - 2010-2040, 2023.
- INE Cabo Verde. *São Vicente em números*. 2021.
- INE Cabo Verde. *São Vicente. Zonas e Lugares*. 2021.
- International Finance Corporation (IFC). A Guide to Biodiversity for the Private Sector: The Social and Environmental Impact Assessment Process: https://www.ifc.org/wps/wcm/connect/9608497e-56e8-4074-bab6-45c61a36a4ad/ESIA.pdf?MOD=AJPERES&CVID=jkCYZ3G
- Martins B, Nunes A, Lourenço L, Velez-Castro F. Flash Flood Risk Perception by the Population of Mindelo, S. Vicente (Cabo Verde). Water. 2019; 11(9):1895. https://doi.org/10.3390/w11091895
- Ministério da Agricultura e Ambiente, Cabo Verde 2020 Update to the first Nationally Determined Contribution (NDC), 2021.
- Ministério da Agricultura e Ambiente National Adaptation Plan of Cabo Verde, 2021
- Ministério da Agricultura e Ambiente. Republic of Cabo Verde. Third National Communication on Climate Change, UNFCCC, Dec 2017.
- PEDS II information on the website of the International Partners Conference – Driving change and accelerating development: https://peds.gov.cv/Caboverde4dev/en/
- Romeiras, M.M.; Catarino, S.; Gomes, I.; Fernandes, C.; Costa, Caujapé-Castells J., Duarte M.C. (2015), IUCN Red List assessment of the Cabo Verde endemic flora: towards a global strategy for plant conservation in Macaronesia, Botanical Journal of the Linnean Society, Volume 180, pages 413-425: https://doi.org/10.1111/boj.12370
- The World Bank, Disaster Risk Profile. Cabo Verde, 2019.
- UNDP Project Document, Consolidation of Cabo Verde's Protected Areas System and UNEP-WCMC (2024). Protected Area Profile for Cabo Verde from the World Database on Protected Areas, April 2024. Available at: www.protectedplanet.net
- United Nations Development Program, Cabo Verde Appliances & Building Energy-Efficiency Project (CABEEP), 2015.
- UN WOMEN. Cabo Verde: Country Gender Profile, 2018.

- U.S. Department of Labour, Cabo Verde, 2022 Findings on the worst forms of child labor.
- U.S. Department of State, Bureau of Democracy, Human Rights and Labor. Cabo Verde 2022 Human Rights Report. Country Reports on Human Rights Practices for 2022, available at:
- https://www.state.gov/reports/2022-country-reports-on-human-rights-practices/Cabo-verde/
- Vasconcelos R, Brito JC, Carranza S, Harris DJ (2013). Review of the distribution and conservation status of the terrestrial reptiles of the Cabo Verde Islands. Oryx, 47: 77-87:
- https://doi.org/10.1017/S0030605311001438

11.2 Standards

- AfDB, Integrated Safeguards System 2023.
- EIB, Environmental and Social Standards, February 2022.

11.3 Websites

- African Development Bank website: https://www.afdb.org/en
- BETA provider website: https://betaenerji.com/en/home/
- Cabo Verde Census 2021: https://ine.cv/censo-2021/
- Cabo Verde Census Page: https://Caboverde.opendataforafrica.org/leiozib/Cabo-verde-census-page
- Direção Nacional do Ambiente:
- https://maa.gov.cv/index.php/min-a-a/62-direcao-nacional-do-ambiente
- EIB website: https://www.eib.org/en/
- IDECV Visor, accessible at https://ingt.maps.arcgis.com/apps/webappviewer/index.html?id=87f14e8118b04dc6bbd75385e2eeba92
- UN InforMEA Information on Multilateral Environmental Agreements. Cabo Verde:
- https://www.informea.org/en/countries/cv/party-status
- Institute for Health Metrics and Evaluation (IHME), Cabo Verde Health Data:
- https://www.healthdata.org/Cabo-verde
- Instituto Nacional de Meteorologia e Geofisica (INMG): https://www.inmg.gov.cv
- IUCN Red List: www.iucnredlist.org
- Noise Tool Calculator: https://noisetools.net/noisecalculator
- PEDS and Driving change, PEDS II: https://peds.gov.cv/Caboverde4dev/en/pedes-e-mudancas/.
- Ramsar webpage: https://rsis.ramsar.org
- Royal Botanic Gardens Kew – Plants of the World Online: www.powo.science.kew.org
- UNESCO information about Cabo Verde: https://uis.unesco.org/en/country/cv

- UN Human Rights Treaty Bodies – Ratification Status for Cabo Verde:
- https://tbinternet.ohchr.org/_layouts/15/TreatyBodyExternal/Treaty.aspx?CountryID=32&Lang=EN.
- World Plants website: www.worldplants.de

Appendix A
Environmental and Social Management Plan

Appendix B
In-Country Diagnosis: Environmental, Social and Climate Change

Appendix C
Stakeholder Engagement Plan

Appendix D
Chance Finds Procedure