Marine Seismic Survey Offshore Mozambique - AS8 | AS7

ENVIRONMENTAL PRE-FEASIBILITY STUDY AND SCOPE DEFINITION

DRAFT REPORT

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ACRONYMS AND ABBREVIATIONS

Acronym	Definition
2D	Two-dimensional; seismic data or acquisition in two dimensions
3D	Three-dimensional; seismic acquisition in three dimensions
4D	4D Seismic; repeated seismic surveys for temporal reservoir monitoring
ADNAP	National Directorate of Fisheries
AIA	Environmental Impact Assessment
AID	Area of Direct Influence
AII	Area of Indirect Influence
AIS	Automatic Identification System (Automatic Identification System)
AMOPI	Mozambican Association of Fishermen of Inhassoro
AMP	Marine Protected Areas
ANAC	National Directorate of Conservation Areas
API	Association of Fishermen of Inhassoro
AQUA	National Agency for Environmental Quality Control
bar	Bar; unit of pressure
BIOFUND	Biodiversity Conservation Foundation [inferred]
°C	Degree Celsius
CCP	Community Fishing Council
CEFMAR	Maritime Surveillance Operations Coordination Centre
CENACARTA	National Centre for Cartography and Remote Sensing [inferred]
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CP	Fishing Centre
CSG	Cetacean Specialist Group, in the context of IUCN-CSG
CTA	Technical Assessment Commission
DINAMC	National Directorate of Environment and Climate Change
EACC	East African Coastal Current
EAME	East African Marine Ecoregion
EAS	Simplified Environmental Study
EBSA	Ecologically or Biologically Significant Marine Area
EHS	Environmental, Health and Safety
EIA	Environmental Impact Study
EICC	East Indian Coastal Current
EN1	National Road No. 1
ENH	National Hydrocarbons Company
E.P.	Public Company
EPDA	Environmental Pre-Feasibility Study and Scoping
EPI	Personal Protective Equipment

Acronym	Definition
ESRI	Environmental Systems Research Institute
EUA	United States of America
FSP	First Shot Point
GEE	Greenhouse Gases
GIIP	Good International Industry Practice
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HSE	Health, Safety and Environment (Health, Safety and Environment)
Hz	Hertz
IAGC	International Association of Geophysical Contractors (International Association of Geophysical Contractors)
IBTrACS	International Best Track Archive for Climate Stewardship
IDEPA	National Institute for the Development of Fisheries and Aquaculture
IDPPE	Institute for the Development of Small-Scale Fisheries
IFC	International Finance Corporation (International Finance Corporation)
IIMP	Institute of Marine and Fisheries Research
IMMA	Important Marine Mammal Area (Important Marine Mammal Area)
IMO	International Maritime Organization (International Maritime Organization)
INAHINA	National Institute of Hydrography and Navigation
INAM	National Institute of Meteorology
INAMAR	National Institute of the Sea
INAMI	National Institute of Mines
INE	National Institute of Statistics
INIP	National Institute of Fisheries Research
INP	National Institute of Petroleum
IOGP	International Association of Oil & Gas Producers (International Association of Oil & Gas Producers)
IP	Process Instruction
I.P.	Public Institute
ISO	International Organization for Standardization (International Organization for Standardization)
ISRA	Important Shark and Ray Area (Important Shark and Ray Area)
ITCZ	Intertropical Convergence Zone (Intertropical Convergence Zone)
IUCN	International Union for Conservation of Nature (International Union for Conservation of Nature)
IUCN-SSC	IUCN Species Survival Commission
JNCC	Joint Nature Conservation Committee (Joint Nature Conservation Committee)
KBA	Key Biodiversity Areas (Key Biodiversity Areas)
LSP	Last Shot Point; last point of firing
MAAP	Ministry of Agriculture, Environment and Fisheries

Acronym	Definition
MAE	Ministry of State Administration
MAP	Mangrove Action Project
MARPOL	International Convention for the Prevention of Pollution from Ships
MIMAIP	Ministry of the Sea, Inland Waters and Fisheries
MIREME	Ministry of Mineral Resources and Energy
MISAU	Ministry of Health
MITADER	Ministry of Land, Environment and Rural Development
MMF	Marine Megafauna Foundation
MMO	Marine Mammal Observer(s) / Marine Mammal Observer(s)
MOPHRH	Ministry of Public Works, Housing and Water Resources
MTL	Ministry of Transport and Logistics
N/A	Not Applicable (Not Applicable)
NASA/POWER	National Aeronautics and Space Administration / Prediction Of Worldwide Energy Resources
NOAA	National Oceanic and Atmospheric Administration
OIT	International Labour Organization
OMM	Marine Mammal Observers
NGO	Non-Governmental Organisation
WIO	Western Indian Ocean
PAM	Passive Acoustic Monitoring
PGA	Environmental Management Plan
SIA	Stakeholders and Affected Parties
NP	National Park
PNAB	Bazaruto Archipelago National Park
UNDP	United Nations Development Programme
POEM	Maritime Spatial Planning
POLMAR	Maritime Policy and Strategy
PPP	Public Participation Process
PSO	Protected Species Observer
PTS	Permanent Threshold Shift
REPMAR	Maritime Fisheries Regulations
SIBMOZ	Mozambique Biodiversity Information System
SPI	Shot Point Interval; interval between seismic shots/points
SWIO	South-West Indian Ocean
TOR	Terms of Reference
UN	United Nations
UNDRR	United Nations Office for Disaster Risk Reduction
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development

Acronym	Definition
USD	United States Dollar
UTM	Universal Transverse Mercator
VHF	Very High Frequency; VHF radio/communication [inferred]
HIV	Human Immunodeficiency Virus
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immunodeficiency Syndrome
VMS	Vessel Monitoring System
WCS	Wildlife Conservation Society
WGS 84/WGS84	World Geodetic System 1984
WoRMS	World Register of Marine Species
WWF	World Wide Fund for Nature
EEZ	Exclusive Economic Zone
ZPT	Total Protection Zone
ZPTM	Marine Total Protection Zones
ZTM	Marine Buffer Zone
ZULCL	Local Community Limited Use Zone
ZUM	Marine Multiple Use Zone

GLOSSARY

Term	Definition
Cyclonic activity	Area: climate and natural hazard. Refers to the occurrence of tropical cyclones, tropical storms, and associated systems that can affect the sea, wind, swell, and safety of offshore operations. In the project, this concept is relevant for defining safe operational windows and contingency plans.
Ballast water	Area: navigation and marine environment. It is water taken up by ships to maintain stability, balance, and safety during navigation. When discharged elsewhere, it can transport marine organisms and contribute to the introduction of invasive species.
Important Area for Marine Mammals	Area: marine ecology. Area recognised for having special importance for marine mammals, for example for feeding, reproduction, migration or seasonal concentration. Its consideration is relevant for adjusting acoustic mitigation measures and operational planning.
Marine Protected Area	Area: biodiversity conservation. Legally defined marine or coastal space for conserving species, habitats, ecosystems or ecological processes. In the project, these areas are relevant for assessing spatial restrictions, ecological sensitivity and compatibility with seismic operations.
Key Biodiversity Areas	Area: biodiversity conservation. Areas identified with global, regional or national importance for the conservation of species and habitats. They are used as a reference for assessing ecological sensitivity and potential risks to biodiversity.
Airgun array	Area: seismic acquisition. Organised set of pneumatic sound sources used to generate acoustic pulses in the water. These pulses propagate through the water column and seabed, allowing geophysical information about geological structures to be obtained.
Navigational warning	Area: maritime safety. Formal communication issued to inform sea users about activities, hazards, temporary restrictions or operational changes. In the project, it is important for preventing conflicts between seismic vessels, fishing vessels and commercial navigation.
Sedimentary basin	Area: geology and hydrocarbons. Geological depression where sediments accumulate over time, potentially containing source rocks, reservoirs and hydrocarbon traps. Seismic acquisition aims to improve knowledge of these structures in the seabed.
Bathymetry	Area: oceanography and marine geophysics. Represents the measurement and description of seabed depths. It is essential for navigation planning, obstacle assessment and understanding underwater sound propagation.
Biofouling	Area: marine environment and navigation. Accumulation of organisms, such as algae, barnacles or molluscs, on the hull and submerged equipment of a vessel. It can transport species between regions and contribute to the introduction of non-native organisms.
Seismic cable / streamer	Area: seismic acquisition. Long cable towed by the seismic vessel, equipped with sensors that record acoustic signals reflected by the seabed. Its configuration at sea influences data quality and operational safety requirements.
Cetaceans	Area: marine ecology. Group of marine mammals that includes whales, dolphins and porpoises. They are particularly relevant in seismic projects because they depend on sound for communication, navigation, feeding and orientation.
Operational constraints	Area: offshore operations management. Factors that may limit, suspend or adjust the execution of activities, such as bad weather, maritime traffic, currents, obstacles, presence of sensitive fauna or visibility conditions. In the project, they condition the daily planning of seismic acquisition.

Term	Definition
Maritime spatial use conflict	Area: maritime spatial planning and socioeconomics. Situation where different activities compete for the same space or time, such as fishing, navigation, conservation and seismic acquisition. Managing these conflicts requires communication, institutional coordination and temporary compatibility measures.
Ocean current	Area: oceanography. Persistent movement of water masses in the ocean, influenced by winds, temperature, salinity, Earth's rotation and coastal configuration. In the project, currents are relevant for navigation, safety, pollutant dispersion and operational planning.
Migratory corridor	Area: marine ecology. Route regularly used by migratory species during seasonal or reproductive movements. In the case of offshore seismics, it is important to consider these corridors to reduce risks of disturbance to marine mammals, turtles, and other sensitive species.
Decibel	Area: acoustics. Logarithmic unit used to express sound levels. In underwater acoustics, it is used to assess the intensity of noise generated by seismic sources and the potential effect on marine fauna.
Demobilisation	Area: project cycle. Final phase in which vessels, equipment, and personnel are removed from the operational area. It must include adequate waste management, closure of logistical activities, and final environmental reporting.
Maritime public domain	Area: maritime law. Set of maritime and coastal spaces and associated resources under the public stewardship of the State. Their use for economic, scientific, or operational activities is subject to specific legal rules and authorisations.
Ecosystem	Area: ecology. Set formed by living beings, the physical environment, and the interactions between them. In the marine environment, it can include reefs, seagrass meadows, mangroves, pelagic zones, and seabeds.
Sensitive ecosystem	Area: ecology and environmental assessment. Ecosystem with high ecological importance, low recovery capacity, or presence of threatened, protected, or endemic species. These ecosystems require greater caution in impact assessment and in defining mitigation measures.
Marine ecoregion	Area: marine biogeography. Spatial unit of the ocean defined by relatively homogeneous ecological, biological, and oceanographic characteristics. The East African Marine Ecoregion is relevant for contextualising the regional biodiversity of the Mozambique Channel.
Effluent	Area: environmental quality. Liquid discharge resulting from a human, industrial, domestic, or operational activity. In offshore activities, effluent management is important to prevent water contamination and comply with environmental standards.
Atmospheric emissions	Area: air quality. Release of gases or particles into the atmosphere, for example from ship engines, generators, or onboard incineration. In projects, this includes emissions associated with navigation and vessel operation.
Invasive species	Area: ecology. Species introduced outside its natural range that can expand and cause negative effects on ecosystems, native species, or economic activities. In maritime operations, ballast water and biofouling are important introduction pathways.
Migratory species	Area: marine ecology. Species that undertake regular movements between different areas, often associated with feeding, reproduction, or seasonal conditions. Marine mammals, turtles, and some pelagic species may fall into this category.
Pelagic species	Area: marine ecology. Species that live mainly in the water column, rather than being associated with the seabed. It includes various oceanic fish and large predators that may occur in offshore areas.

Term	Definition
Protected species	Area: conservation and environmental legislation. Species whose capture, disturbance, trade, or damage is limited or prohibited by law or international conventions. In projects, the presence of protected species requires preventive measures and mitigation procedures.
Cumulative acoustic exposure	Area: underwater acoustics. Represents the accumulation of sound energy received by an organism over time or from multiple seismic shots. It is relevant because biological effects may depend not only on a single sound but on repeated exposure.
Fatal flaw	Area: environmental assessment. Environmental, social, legal, or technical condition that can make a project unviable by generating unacceptable risk or unmitigable incompatibility. In the EPDA, its identification allows for guiding the decision before the detailed EIA phase.
Seismic sound source	Area: marine geophysics. Equipment used to emit controlled acoustic energy into the water, generally by means of airguns. The sound reflected by geological layers is recorded by sensors and used to interpret the subsurface.
Geophysics	Area: geosciences. Set of methods that study the structure and physical properties of the Earth through indirect measurements, such as seismic waves, gravity, or magnetism. Seismic acquisition is one of the main geophysical methods used in hydrocarbon exploration.
Habitat	Area: ecology. Location or type of environment where a species lives, feeds, reproduces, or shelters. In the report, habitats such as reefs, mangroves, seagrasses, and pelagic zones are relevant for assessing ecological sensitivity.
Mitigation hierarchy	Area: environmental management. Sequence of preference for managing impacts: avoid, minimise, restore, and, where applicable, offset. This approach is consistent with international best practices and should guide the PGA.
Hydrocarbons	Area: oil and gas. Chemical compounds formed by hydrogen and carbon, such as oil and natural gas. Seismic acquisition seeks to identify geological structures with the potential to contain these resources.
Hydrophone	Area: acoustics and seismic acquisition. Underwater sensor that detects sound pressure variations in the water. In seismic streamers, hydrophones record the signals reflected by the seabed.
Monitoring indicator	Area: environmental management. Parameter used to verify if a management measure is being implemented and if it is producing the expected effect. In the PGA, indicators help transform environmental commitments into verifiable actions.
Seismic line	Area: seismic acquisition. Planned path followed by the seismic vessel during data collection. The organisation of lines influences area coverage, data quality, and operational manoeuvres.
Marine mammals	Area: marine ecology. Group of animals that includes whales, dolphins, dugongs, and other mammals adapted to the marine environment. They are sensitive receptors in seismic projects due to the importance of sound in their behaviour and communication.
Territorial sea	Area: maritime law. Belt of sea adjacent to the coast over which the State exercises sovereignty, under national and international law. It is one of the zones considered in the legal framework for maritime activities.
Significance matrix	Area: impact assessment. Tool used to combine criteria such as magnitude, duration, extent, reversibility, and probability, allowing the importance of an impact to be classified. It helps make the assessment more transparent and comparable.
Receptor environment	Area: environmental assessment. Environmental or social component that may be affected by an activity, such as marine fauna, water quality, fisheries, or navigation. The correct identification of receptors is essential for assessing impacts.

Term	Definition
Livelihoods	Area: socioeconomics. Activities and resources that allow people to secure income, food, and living conditions. In the project, they are particularly associated with artisanal and semi-industrial fishing, tourism, and sea-dependent coastal activities.
Seismic method	Area: geophysics. Technique that uses acoustic waves to investigate the subsurface structure. In a marine environment, a sound source emits pulses that are reflected by geological layers and recorded by towed sensors.
Depth migration	Area: seismic processing. Processing technique that repositions seismic signals to better represent the actual geometry of geological structures at depth. It is used to improve the imaging of reservoirs and faults.
Underwater acoustic modelling	Area: acoustics and impact assessment. Simulation of sound propagation in water, considering sound sources, depth, bathymetry, water characteristics, and distance. It is used to estimate exposure areas and support the definition of mitigation measures.
Passive Acoustic Monitoring	Area: marine ecology and acoustic mitigation. Technique that uses hydrophones to detect marine mammal vocalizations without emitting sound. It is particularly useful at night or in low visibility conditions, when visual observation is limited.
Adaptive monitoring	Area: environmental management. Approach in which management measures are adjusted based on monitoring results and new information available. It allows for improved mitigation effectiveness during project execution.
Visual monitoring	Area: offshore environmental mitigation. Direct observation of the sea surface by trained observers to detect marine mammals, turtles, or other sensitive species. It supports operational decisions such as starting, postponing, or suspending seismic activities.
Monsoon	Area: climatology and oceanography. Seasonal wind regime that influences currents, precipitation, and oceanic conditions. In the Mozambique Channel and Indian Ocean, monsoons contribute to seasonal variations relevant for offshore planning.
Multiclient	Area: geophysical industry. Model in which seismic data is acquired by a specialised company for subsequent licensing to multiple clients. This model allows for the creation of geophysical libraries useful for regional oil potential assessment.
Seismic vessel	Area: offshore operations. Specialised vessel that tows sound sources and seismic cables to acquire geophysical data. Its operation requires route planning, safety zones, logistical support, and specific environmental measures.
Offshore	Area: maritime operations. Term used for activities carried out at sea, away from the coast. In the project, it refers to seismic acquisition in maritime areas under Mozambican jurisdiction.
Swell	Area: operational oceanography. Movement of waves on the sea surface, described by height, period, and direction. High swell conditions can affect safety, visibility, equipment operation, and crew comfort.
Underwater cultural heritage	Area: archaeology and heritage. Cultural, historical, or archaeological remains located on the seabed, such as shipwrecks, artefacts, or submerged structures. The EIA must consider the possibility of their occurrence and define procedures for damage prevention.
Continental shelf	Area: maritime law and geology. Natural prolongation of the land territory under the sea, including the seabed and subsoil. It is relevant for sovereign rights over natural resources and for the framework of offshore activities.

Term	Definition
Marine pollution	Area: environmental quality. Direct or indirect introduction of substances, energy, or waste into the marine environment that may cause harm to ecosystems, human health, or legitimate uses of the sea. In offshore operations, it can be associated with spills, improper discharges, waste, or emissions.
Probability	Area: impact and risk assessment. Degree of possibility of an impact or event occurring. In the assessment matrix, probability is combined with consequence to estimate significance or risk level.
Environmental or social receptor	Area: impact assessment. Element that may be affected by the project, such as marine fauna, habitats, water quality, fishermen, navigation, or coastal communities. Receptor analysis allows the assessment to be directed towards the most relevant themes.
Tidal regime	Area: oceanography. Regular pattern of sea level rise and fall caused mainly by the gravitational pull of the Moon and Sun. Influences coastal currents, navigation, intertidal ecosystems, and operations in coastal areas.
Hazardous waste	Area: waste management. Waste that exhibits hazardous characteristics, such as toxicity, flammability, corrosivity, or risk of contamination. In maritime operations, its management must follow legal requirements and specific procedures for storage, transport, and final disposal.
Environmental risk	Area: environmental management. Combination of the probability of an event occurring and the severity of its environmental or social consequences. In the project, it applies to scenarios such as spills, collisions, fauna disturbance, or conflicts in the use of maritime space.
Underwater noise	Area: marine acoustics. Sound produced in the aquatic environment by natural sources or human activities, such as ships and seismic sources. It can affect marine organisms, especially species that use sound for communication, orientation, or feeding.
Seasonality	Area: ecology, climate, and socioeconomics. Regular variation of environmental conditions or human activities throughout the year. In the project, it is relevant for cyclones, monsoons, species migrations, fishing seasons, and tourism.
Environmental sensitivity	Area: environmental assessment. Degree to which a receptor or area can be affected by an external pressure, considering vulnerability, ecological importance, and recovery capacity. Areas with threatened species, rare habitats, or critical ecological functions tend to have higher sensitivity.
Ecosystem services	Area: ecology and socioeconomics. Benefits that ecosystems provide to people, such as food, coastal protection, climate regulation, tourism, and biodiversity support. In the project, mangroves, reefs, and seagrass beds can provide important services to local communities and the economy.
Shutdown	Area: seismic operational mitigation. Procedure for immediate or controlled interruption of the seismic source when risk conditions are observed, such as the presence of sensitive species in a defined zone. It is an essential measure to reduce potential effects on marine mammals and other species.
Fish stock	Area: fisheries and marine ecology. Population of a species exploited by fishing in a specific area and period. Stock assessment is important for understanding fishery resources and potential interactions with offshore activities.
Maritime traffic	Area: navigation and safety. Movement of vessels in a specific area, including commercial ships, fishing vessels, support craft, and local traffic. It is assessed to prevent collisions, operational interference, and use conflicts.
Exclusion zone	Area: operational mitigation. Area defined around the seismic source or operation where the presence of sensitive species may prevent the start or require

Term	Definition
	interruption of activity. It is a central measure to reduce acoustic risks to marine fauna.
Total Protection Zone	Area: conservation. Protection category with high restrictions on natural resource use, intended to conserve habitats, species, or ecosystems of particular importance. In the project, it is relevant due to its proximity to sensitive areas such as Cape São Sebastião.
Exclusive economic zone	Area: maritime law. Maritime area where the coastal State holds sovereign rights to explore, conserve, and manage natural resources. In Mozambique, it encompasses part of the offshore prospecting and data acquisition activities.
Pelagic zone	Area: oceanography and marine ecology. Part of the water column away from the seabed and the immediate coast. It is the environment where many oceanic species occur, including pelagic fish, cetaceans, and migrating turtles.
Buffer zone	Area: conservation and management. Area surrounding a protected zone where usage rules are applied to reduce pressure on the conservation core. It can help reconcile human activities with ecological protection objectives.

1 INTRODUCTION

SLB is the proponent of this Project, operating in Mozambique within the scope of its global energy industry service and technology provision operations. Following the Third Tender for Geophysical Data Acquisition in the Sedimentary Basins of Mozambique, launched by the National Petroleum Institute (INP), SLB was selected as the winning bidder for the acquisition of 3D seismic data in areas AS7 25 and AS8 25, granting it legitimacy to develop this Project in the aforementioned areas.

The intervention areas subject to this Project correspond to the areas designated AS7 and AS8, with surfaces of approximately 50,532.375 km^2 and 18,706.259 km^2, respectively, located in offshore sedimentary basins under the jurisdiction of the Republic of Mozambique. The implementation of the Project aims at the acquisition and processing of three-dimensional seismic data, fitting into national efforts to assess and enhance petroleum potential, under the coordination and supervision of the INP.

To ensure compliance with the current legal and institutional framework, namely the Environmental Law (Law No. 20/1997, of 1 October) and the Petroleum Operations Regulation (Decree No. 24/2004, of 20 August), the proponent submits the Project to the competent Environmental Impact Assessment (EIA) process, with a view to obtaining the Environmental Licence prior to the commencement of activities. The EIA process is conducted in accordance with the Regulation on the Environmental Impact Assessment Process (Decree No. 54/2015, of 31 December) and, being applicable to the oil and gas sector, will also observe the relevant provisions of the EIA Regulation for Oil and Gas Activities (Decree No. 56/2010, of 22 November).

Solis Ad Sapientiam, Lda. (Solis) was contracted by SLB to ensure the technical coordination and management of this EIA process, including the preparation of the Environmental Pre-Feasibility Study and Scoping (EPDA), and the Terms of Reference (ToR) for the Environmental Impact Study (EIA). Solis is duly registered with the competent environmental authority for conducting environmental studies in Mozambique, as per the documentation submitted in **Annex I.**

The Process Instruction Report was submitted to the Ministry of Agriculture, Environment and Fisheries (MAAP) in May of 2026. Following the preliminary assessment by the MAAP, the Project was classified as Category A on 8 May 2026 (Letter Ref. 211/MAAP/DINAMC/GDN/220/26 – see **Annex II**), thus requiring a full EIA process.

This document corresponds to the Environmental Pre-Feasibility Study and Scoping (EPDA), including the respective Terms of Reference (ToR) for the Environmental Impact Study (EIA), to be submitted to the Ministry of Agriculture, Environment and Fisheries (MAAP). The main objectives of this phase of the EIA process are to preliminarily identify the potential impacts environmental and social aspects associated with the Project, assess its environmental feasibility, delineate critical areas and issues to be deepened in the EIA, and define the scope, methodology, and content of the specialized studies to be developed in the subsequent phase of the SEA process.

1.1 Identification and Presentation of the Proponent

SLB is a global technology company that provides technological services and solutions for the energy industry. In Mozambique, SLB carries out relevant work in close collaboration with public entities, academic institutions, and industry operators. In partnership with the National Petroleum Institute (INP), SLB leads the *Mozambique Enlightenment Project*, which involves the reprocessing, using advanced broadband depth migration technologies, of a seismic survey acquired in 2013 in the Mozambique Channel and the Zambezi Delta, with the objective of improving the imaging of deepwater reservoirs, fault resolution, and the reliability of direct indicators of hydrocarbons. The company is also responsible for an extensive multi-client library of offshore seismic data, which includes over 110,000 km of exclusive 2D data and approximately

15,000 km² of broadband 3D data acquired in the Angoche Basin with IsoMetrix technology, made available for licensing in the context of the concession rounds promoted by the INP, constituting today one of the main references for technical support in the assessment of national oil potential.

Complementarily, SLB has been developing cooperation initiatives with the Mozambican academic community, notably through a partnership with Eduardo Mondlane University, aimed at strengthening skills in digital technologies applied to the energy sector and promoting advanced training for national professionals, which reinforces its integration into the country's institutional fabric and its commitment to local capacity development.

Table 1-1: Proponent Identification

Project Proponent	
Eastern Echo FZE (SLB) WWA115, Jebel Ali Freezone, PO Box 9261 Dubai, United Arab Emirates	
+44 7584 218915	**Raja Yedupati vyedupati@slb.com**

1.2 Consultant Identification

Solis is a pioneering consultancy firm based in Mozambique, comprising a team of experienced specialists dedicated to providing comprehensive social and environmental solutions across various sectors.

With a strong focus on innovation and excellence, we help our clients navigate complex regulatory contexts with confidence, ensuring full compliance with national legislation and recognised international standards, such as the IFC Performance Standards, the World Bank Environmental and Social Framework, the African Development Bank Integrated Safeguards System, and the United Nations Guiding Principles on Business and Human Rights.

Solis was contracted by SLB as the environmental consultant responsible for conducting the EIA process, including the preparation of this RS. Information regarding Solis' registration as an environmental consultant with the Mozambican environmental authority is included in the **Annex I**.

Table 1-2: Environmental Consultant Identification

Environmental Consultant	
Solis Ad Sapientiam Lda 114 António Simbine Street Sommerschield Neighbourhood Maputo – Mozambique	
+258 84 259 6788	**Emanuel Viçoso evicoso@solis.co.mz**

2 INSTITUTIONAL AND LEGISLATIVE FRAMEWORK

The implementation of the offshore seismic data acquisition Project takes place within an institutional context involving, with differentiated competences, the environmental, maritime, and oil and gas sector authorities in Mozambique. In the following sections are identified, the scope of their attributions is clarified and it is evidenced how the Project fits into their respective spheres of action, ensuring from the outset the articulation with applicable legal and regulatory requirements.

2.1 Environmental Authorities

The oversight of policies on environment, climate change, and sustainable management of natural resources currently falls to the **Ministry of Agriculture, Environment and Fisheries (MAAP)**. MAAP is the central authority responsible for the formulation, coordination, and execution of the national environmental policy, for the integration of environmental considerations into development planning, and for defining the basis for the sustainable management of territory and natural resources.

Within MAAP, the **National Directorate of Environment and Climate Change (DINAMC)** constitutes the main technical reference body for environmental impact assessment and for the coordination of climate change matters. Among other functions, it is responsible for conducting the Environmental Impact Assessment (EIA) process, including the pre-assessment and categorisation of projects, in accordance with Decree No. 54/2015, defining the requirements for subsequent studies, as well as for the issuance, renewal, and eventual revocation of Environmental Licences.

At provincial level, MAAP's competences are exercised by the **Provincial Services of the Environment (SPA)**, which ensure local project monitoring, coordination with district administrations and other sectors, as well as monitoring compliance with licence conditions during the implementation phase. For offshore seismic activities with onshore interfaces (logistics bases, support ports, equipment circulation), these services play an important role in assessing local impacts and in liaising with communities and provincial authorities.

In the specific domain of environmental quality, the **National Agency for Environmental Quality Control (AQUA)** stands out, created to develop and implement integrated pollution control strategies and to monitor air, water, and soil quality, including verifying compliance with emission and waste management standards.

The **National Administration of Conservation Areas (ANAC)** is the entity responsible for the management of national conservation areas, including parks, reserves, and other protection categories. It is responsible for ensuring the conservation of biodiversity and ecosystems, as well as regulating and reconciling economic activities with conservation objectives in protected areas. For the present Project, ANAC becomes relevant whenever seismic survey areas are located in proximity to marine or coastal conservation areas, requiring the analysis of potential land-use conflicts, the definition of spatial or temporal restrictions, and, if necessary, the coordination of specific mitigation measures.

2.2 Maritime and Fisheries Authorities

The oversight of matters relating to maritime space, navigation, the blue economy, and fisheries resource management in Mozambique is shared by different government sectors, notably the **Ministry of Transport and Logistics (MTL)** to MAAP. These entities complementarily ensure the regulation of activities in the maritime domain and the sustainable management of living marine resources. For offshore seismic acquisition activities, this institutional coordination is crucial, taking into account the interfaces with navigation safety, maritime spatial planning, and fishing use.

The **National Institute of the Sea, I.P. (INAMAR),** under the supervision of MAAP, constitutes the national maritime authority, being responsible for the regulation, supervision, and inspection of activities in the maritime space under Mozambican jurisdiction. INAMAR is responsible, among other functions, for ensuring navigation safety, issuing authorisations for maritime operations, coordinating maritime traffic, and promoting coordination with other relevant sectoral entities, including defence, environment, and fisheries. For offshore seismic operations, INAMAR plays a central role in issuing operational authorisations, defining safety zones, and disseminating navigation warnings, in accordance with applicable maritime legislation.

Still in the technical domain of navigation, the **Marine and Fisheries Research Institute (IIMP)** ensures the production and availability of hydrographic and cartographic information, including nautical charts and oceanographic data. These competencies are relevant for the safe planning of seismic operations, namely in defining routes, assessing bathymetric conditions, and mitigating navigation-related risks.

In the fisheries sector, under the supervision of MAAP, the **National Directorate of Fisheries (ADNAP)**is noteworthy, responsible for the management, planning, and administration of fishing activities, including licensing and defining resource management measures. ADNAP is particularly relevant in identifying fishing areas potentially affected by seismic operations and in reconciling these with the rights and practices of sea users.

Complementarily, the **National Institute for the Development of Fisheries and Aquaculture (IDEPA)** intervenes at the level of support for artisanal fishing and the development of fishing communities, playing an important role in coordination with local maritime space users and in the public participation process. For projects with potential interference in artisanal fishing activities, this entity constitutes a relevant interlocutor for identifying areas of use, seasonality, and economic dependence of communities.

In the scientific domain, the **National Institute of Fisheries Research (INIP) is** responsible for research applied to marine resources, including the monitoring of stocks, habitats, and ecological dynamics. The information produced by this entity is relevant for assessing potential impacts of seismic operations on biological resources and for defining adequate mitigation measures, particularly during ecologically sensitive periods.

At the provincial level, the responsibilities of these entities are operationalised by the **Provincial Services for the Sea, Inland Waters and Fisheries**, as well as by local INAMAR representations, ensuring the monitoring of activities on the ground, coordination with district authorities, and liaison with fishing communities. For offshore seismic activities with onshore logistical interfaces (ports, support bases), these services are particularly relevant in managing operational aspects and in institutional communication at the local level.

In the context of the present Project, the coordination between maritime and fisheries authorities will be essential to ensure the compatibility of seismic operations with navigation safety, the protection of fisheries resources, and the safeguarding of the livelihoods of sea-dependent communities.

On a logistical level, the **Port of Beira and the Port of Quelimane** constitute strategic infrastructures for the support of seismic data acquisition activities, as they can be used for the mobilisation and demobilisation of vessels, equipment, and personnel, as well as for supply and other port services. As commercial ports managed by public enterprise entities, they are subject to specific safety, port operation, and protection regulations environmental, requiring the proponent to ensure coordination with the respective port administrations and full compliance with the rules applicable to the use of their facilities and services within the scope of the Project.

2.3 Oil and Gas Authorities

The oversight of hydrocarbon exploration, development, and production activities in Mozambique is ensured by the **Ministry of Mineral Resources and Energy (MIREME)**, as the central state body responsible for defining, coordinating, and implementing policies in the field of mineral and energy resources. In the context of offshore seismic acquisition projects, this sector assumes particular relevance in verifying the legal framework of the activity, specifically regarding hydrocarbon exploration rights and compatibility with concessioned areas.

Under the oversight of MIREME, the **National Petroleum Institute, I.P. (INP)** constitutes the regulatory entity for the oil and gas sector, being responsible for the administration, promotion, and supervision of petroleum operations in national territory, including offshore areas. The INP is responsible, among other functions, for managing concession contracts, approving work programmes, supervising prospecting and exploration activities (including seismic acquisition), as well as ensuring the technical and legal compliance of operations with applicable legislation. For offshore seismic activities, the INP plays a decisive role in validating the proponent's right to carry out data acquisition, either within the scope of existing concession contracts or under specific regimes, such as multi-client operations.

In the domain of petroleum data management, the INP also ensures the custody and regulation of access to geoscientific information acquired in national territory, including seismic data. This function is particularly relevant for multi-client operations, as it implies defining conditions for the acquisition, use, sharing, and eventual commercialisation of data, in accordance with applicable sectoral regulations.

On an operational level, offshore seismic acquisition activities are, as a rule, conducted by petroleum operators or specialised service companies, under authorisation from the INP and within the framework of contracts or agreements established with the Mozambican State. In these cases, the proponent must demonstrate the existence of a valid title that legitimises the carrying out of the activity, including authorisations issued by the INP or agreements with concessionaires of petroleum blocks.

Besides the INP, the **National Institute of Mines (INAMI)** intervenes in the extractive sector, although with competencies predominantly associated with solid mineral resources. Its relevance for the present Project is indirect, potentially occurring in situations of overlapping rights or the need for institutional coordination in spatial planning and maritime space use.

Additionally, the **National Hydrocarbons Company, E.P. (ENH)**, as a state-owned company representing the State in oil projects, it participates as a concessionaire or partner in exploration and production contracts. ENH may be relevant in the context of seismic operations, particularly when they occur in areas where it holds stakes or interests, being a stakeholder in the acquisition and use of geophysical data.

At a strategic and coordination level, the liaison between MIREME, INP, and other sectoral entities is essential to ensure that offshore seismic activities comply with applicable legal and contractual instruments, as well as national energy sector development policies.

2.4 Legal Regime for Environmental Impact Assessment

The legal regime of EIA in Mozambique is based on **Law No. 20/97, of 1 October (Environment Law)**, which defines the general principles of environmental protection and enshrines the obligation of prior assessment of activities likely to cause significant impacts. This basic framework is operationalised by a set of regulatory instruments that establish the procedures, technical requirements, and institutional responsibilities associated with environmental licensing.

The main regulatory instrument is **Decree No. 54/2015, of 31 December, which governs the EIA Process.** This Decree sets out the rules for submission, analysis, and decision-making on projects, introducing the

Process Instruction (IP) as the initial document for pre-assessment and categorisation purposes, as well as classifying projects into Categories A+, A, B, and C, according to the magnitude and significance of foreseeable impacts. It also defines the different stages of the process – pre-assessment, potential feasibility studies and scope definition (EPDA), study preparation (EIA or EAS), technical review, public consultation, and issuance of the Environmental Licence – establishing legal deadlines, formal submission requirements, and the obligation to implement an Environmental Management Plan (PGA) and respective monitoring programmes.

Complementarily, the EIA process is guided by the **General Directives for Environmental Impact Studies**, approved by **Ministerial Diploma No. 129/2006**, which establish the principles, structure, and minimum content of the studies. These directives stipulate that the EIA must be conceived as an instrument integrated into the project's life cycle, influencing its own design, and must include, among other elements, a detailed description of the activity and the alternatives considered, the characterisation of the baseline situation (physical, biological, and socioeconomic environment), the identification, prediction, and evaluation of impacts, the definition of mitigation and compensation measures, the preparation of a PGA and monitoring programmes, as well as the analysis of risks and alternative scenarios. They also reinforce principles such as the proponent's responsibility for preparing the study and conducting the public consultation process, the analysis of location and technology alternatives, the technical-scientific basis of data and methodologies, and the integration of environmental assessment from the project conception phase.

Regarding public participation, **Ministerial Diploma No. 130/2006, which approves the General Directive for Public Participation in the EIA process**, applies. This diploma establishes public participation as a mandatory and cross-cutting element, requiring consultations during the scope definition (EPDA) and EIA presentation phases, as well as the identification and involvement of interested and affected parties, ensuring transparency and adequate access to information. The concerns and comments collected must be recorded, analysed, and responded to in a Public Participation Report, which is integrated into the decision-making process.

From a procedural point of view, environmental licensing follows a structured sequence: it begins with the submission of the Process Instruction (IP and complementary elements) and continues, according to the assigned category, with the approval of Terms of Reference, elaboration and review of studies (EIA or EAS), public consultations, and eventual carrying out of environmental audits during the construction, operation, and decommissioning phases. The legal framework requires, among other aspects, that studies be prepared in Portuguese, that the technical-scientific data be duly referenced and methodologically justified, that knowledge gaps be identified and mitigation measures proposed, and that continuous monitoring of impacts be ensured, with adaptive adjustments to environmental management measures whenever necessary.

2.5 Legal Framework for the Maritime Space, Navigation and Maritime Surveillance

The legal regime applicable to the sea, navigation, and offshore activities in Mozambique is based on an articulated set of diplomas that define the national maritime domain, the mechanisms for spatial planning and management of the maritime space, and the systems for control, inspection, and navigation safety. The **Law No. 20/2019, of 8 November (Maritime Law)** constitutes the main structuring instrument, by establishing the legal framework for the public maritime domain and spaces under national jurisdiction, covering inland waters, the territorial sea, the contiguous zone, the exclusive economic zone (EEZ), and the continental shelf, as well as the State's sovereign rights over the living and non-living natural resources of the seabed, subsoil, and water column. This law also defines the regime for the use and exploitation of maritime space, framing various economic, scientific, and resource exploration activities.

The Maritime Law enshrines the **principle of integrated maritime spatial management**, promoting compatibility between different uses – such as fishing, maritime transport, oil and gas operations, nature conservation, and scientific research – and requiring close coordination between the various sectors involved in maritime activities. In close connection, the **Legal Regime of the National Maritime Space (Law No. 21/2017)** establishes the spatial planning instruments, notably the **Maritime Spatial Plan (POEM)**, which defines the spatial distribution of activities and zones of preferential use. This regime regulates the attribution of titles for private use of maritime space, necessary for activities such as geophysical prospecting, hydrocarbon exploration, or infrastructure installation, and requires compatibility with other existing uses and environmentally sensitive areas, assuming particular relevance for offshore seismic acquisition projects.

At the strategic governance level, **Decree No. 67/2021 creates the National Maritime Council**, an intersectoral coordination body responsible for ensuring the articulation of public policies related to the sea, promoting the implementation of the blue economy, and harmonising sectoral interests, resolving conflicts of maritime space use. This council acts as a platform for alignment between different authorities, reinforcing coherence between economic priorities, environmental protection, and maritime safety.

At the operational and inspection level, the legal framework was strengthened by **Decree No. 72/2024, which establishes the Maritime Inspection Operations Coordination Centre (CEFMAR).** This multidisciplinary centre integrates all entities with surveillance powers in the national maritime space, with the objective of ensuring coordinated and effective action. CEFMAR exercises powers over the entire maritime space, including the seabed and subsoil, inland waters, and adjacent public domain, coordinating surveillance, patrol, and control operations, focusing on combating maritime offences, pollution, illegal fishing, and risks to navigation safety. To this end, it brings together entities such as the Navy, the Coastal Police, the INAMAR, maritime transport and safety entities, the INP, ANAC, AQUA, and other relevant bodies, operating based on monitoring systems such as AIS, VMS, and maritime alert and surveillance platforms.

This framework reveals an evolution towards an integrated maritime surveillance model, particularly relevant for offshore activities, including seismic acquisition, which involve multiple interfaces: navigation safety, environmental protection, maritime space management, and interaction with fisheries and other economic activities. In parallel, the national navigation regime is articulated with the international norms of the International Maritime Organization (IMO) and with internal regulations on ship registration, maritime safety, pollution prevention from ships, and maritime traffic control, under the supervision of the competent maritime authorities.

2.6 General Legal Framework of the Hydrocarbons Sector

The hydrocarbon sector in Mozambique is based on a state ownership model of natural resources, with exploration delegated to public and private entities through concessions, whose fundamental principles are based on:

- Petroleum resources (oil and gas) belong to the State;
- Exploration is carried out through concession contracts;
- The State maintains strategic control and participates through public companies (e.g., ENH);
- The sector is regulated by specific legislation (Petroleum Law) and complementary instruments (fiscal, environmental, and institutional).

The legal framework for the hydrocarbon sector in Mozambique is based on an articulated set of diplomas that regulate, in an integrated manner, the concession of rights, the execution of petroleum operations, and their environmental management, with direct implications for seismic data acquisition projects.

Legal basis for petroleum operations

The Petroleum Operations Regulation, approved by Decree No. 34/2015, of 31 December, implements the Petroleum Law (Law No. 21/2014, of 18 August), establishing the rules for granting the right to carry out petroleum operations through concession contracts. This regulation stipulates that all petroleum operations, including reconnaissance, exploration, and production activities, pipeline systems, and associated infrastructure, must be carried out systematically and under comprehensive and coordinated supervision, ensuring compliance with industry best practices, safety, health, and environmental protection.

Operations are structured into four types of concession contracts: only for reconnaissance, research and production, pipeline systems, and infrastructure construction and operation. The allocation of these rights is, as a rule, made through public tender, with defined minimum procedures and deadlines, allowing simultaneous or direct negotiation only in expressly provided cases (for example, remaining areas from previous tenders or the joining of adjacent areas). For all types of concession, the regulation imposes requirements for demonstrating technical competence, experience, and financial capacity, as well as the obligation to conduct operations prudently, in accordance with applicable legislation and good oil industry practices.

Specific framework for seismic acquisition

Within the scope of the reconnaissance concession contract, Decree No. 34/2015 expressly provides that the concession may include geophysical survey activities, namely seismic, magnetic, gravimetric, geochemical surveys, and other relevant studies, as well as sample collection and shallow calibration drilling up to 100 m. The reconnaissance contract must include an activity plan indicating the methods and deadlines for execution, describing the technologies and methods to be used, the naval or aerial means mobilised, the objective, and the period of operations. In the specific case of the Project, the 3D offshore seismic acquisition in areas AS7 and AS8 falls under this reconnaissance regime, as reflected in the award of the Third Tender for Geophysical Data Acquisition promoted by INP.

The regulation also defines transversal duties relevant to seismic operations, including the confidentiality of acquired data (with specific deadlines for reconnaissance and research/production data), the obligation to establish management systems that ensure supervision and continuous improvement of operations, and personnel qualification and training requirements. These elements are particularly relevant for multi-client seismic data acquisition projects, where the concessionaire must manage large volumes of data, ensure its technical integrity, and ensure that future use complies with confidentiality rules and the State's interests.

Articulation between concession, strategy, and environmental management

The Strategy for the Concession of Areas for Petroleum Operations, approved by Resolution No. 39/2021, of 4 August, provides the strategic framework for the allocation of research and production rights, as well as reconnaissance contracts throughout the national territory, including territorial waters, the exclusive economic zone, and the continental shelf. This Strategy aims to ensure the continuation of systematic hydrocarbon exploration in the Mozambique and Rovuma basins, promote private and foreign investment, define priority prospective areas, and establish transparent rules for public tenders, negotiations, and reserves, in accordance with international best practices.

The document highlights that the country has already acquired over 200,000 km of 2D seismic and 55,000 km^2 of 3D seismic, as well as 235 exploration and production wells, demonstrating the historical importance of geophysical data acquisition in building the knowledge base on national petroleum potential. The Strategy foresees, among other actions, the use of reconnaissance contracts with companies specialised in speculative seismic and geochemical surveys for areas with limited data, as well as the preparation of data packages and the provision of seismic libraries to support tenders and investment decisions. These guidelines directly frame projects such as the present one, in which a company with proven experience in

seismic acquisition is contracted to implement multi-client surveys in predefined areas (AS7 and AS8), under INP supervision and in compliance with the environmental requirements of Decree No. 56/2010 and Decree 54/2015.

2.7 Summary of the Most Relevant National Legislation

The relevance and applicability of these diplomas to the Project are briefly discussed in the table below. Note that a given decree may be relevant to distinct matters, e.g., the Environmental Law should be considered in different aspects, such as biodiversity conservation or waste management, among other examples.

Table 2-1: Summary of applicable national legislation.

Legislation	Description	Relevance
ENVIRONMENTAL ASSESSMENT		
Law No. 20/97 of 1 October – Environmental Law)	Defines the legal basis for the proper use and management of the environment for the country's sustainable development. The Environmental Law applies to all public and private activities that directly or indirectly affect the environment.	The Project must consider the principle of sustainable development, defined by the Environmental Law, throughout its entire lifecycle. This EIA is part of that effort.
Resolution No. 5/95 of 6 December – National Environmental Policy	Establishes the basis for all environmental legislation. According to Article 2.1, the main objective of this policy is to ensure sustainable development in order to maintain an acceptable balance between socio-economic development and environmental protection. To achieve this objective, this policy must ensure, among other requirements, the integration of environmental considerations into socio-economic planning, the management of the country's natural resources, and the protection of ecosystems and essential ecological processes.	The Project must aim to achieve the policy's objectives by integrating environmental considerations into the engineering design, so as to minimise impacts on natural resources and ecosystems. The environmental and social assessment carried out within the scope of this EIA includes contributions with the objective of ensuring the environmental sustainability of the project in all its phases.
Decree No. 54/2015 of 31 December - Regulation on the Environmental Impact Assessment Process	Establishes the EIA process as one of the fundamental instruments for environmental management, aiming to mitigate the negative impacts of public and private sector projects on the natural and socio-economic environment, through the carrying out of environmental studies before the project commences. It defines the EIA process, the necessary environmental studies, the PPP, the process for reviewing studies, the decision-making process on environmental viability, and the issuance of an environmental licence. It applies to all public or private activities with a direct or indirect influence on the environment.	The Project must be submitted to a formal EIA process, in accordance with this regulation. An environmental licence must be obtained from MAAP, and the issuance of this licence precedes any other licence or authorisation required for the Project. The present EIA process is in compliance with the legislation's requirements and is essential for environmental licensing.
Decree No. 45/2024 of 26 June – Regulation on the Environmental Audit Process	Defines environmental auditing as an objective and documented instrument for the systematic management and evaluation of the management system and documentation implemented to ensure environmental protection. Its objective is to assess compliance with operational and work processes with the environmental management plan, including current legal environmental requirements, approved for a given project.	During the Project's lifetime, the Proponent shall carry out independent annual environmental audits, by contracting a licensed consultant(s) for this purpose, without prejudice to any public environmental audits that may be requested under this decree. The recommendation to carry out independent annual audits will be included in the Environmental and Social Management Plan (ESMP).

Legislation	Description	Relevance
Decree No. 51/2024 of 17 July – Regulation on Environmental Inspection Activity	Establishes the mechanisms for the exercise of environmental inspection of public and private activities that may directly or indirectly negatively influence the environment. Its object is to regulate the inspection activity for compliance with environmental protection and quality standards at the national level.	During the Project's lifecycle, the MAAP may conduct inspections to verify compliance with environmental legislation and the implementation of the PGA. The Proponent shall collaborate and facilitate these inspections.
Ministerial Diploma No. 129/2006 of 19 July - General Directive for the Preparation of Environmental Impact Studies	Details the procedures for obtaining an environmental licence, as well as the format, general structure, and content of the EIA report. Its objective is to standardise the procedures followed by various key stakeholders in the AIA process.	The EIA report must be prepared in accordance with the specifications described in this Ministerial Diploma.
Ministerial Diploma No. 130/2006 of 19 July - General Directive for Public Participation in EIA	Defines the basic principles, methodologies, and procedures for Public Participation within the scope of EIA. It considers public participation an interactive process that begins in the conception phase and continues throughout the project's lifecycle.	The Public Participation process for EIA must be developed in accordance with the specifications described in this Ministerial Diploma.
MINING ACTIVITIES		
Decree No. 26/2004 of 20 August - Environmental Regulation for Mining Activity	Establishes the norms for preventing, controlling, mitigating, rehabilitating, and compensating for the adverse effects that mining activity may have on the environment, with a view to the sustainable development of the activity.	Alongside environmental legislation, the project must comply with the protection, mitigation, and compensation requirements that its activity may have on the environment.
Law No. 20/2014, of 18 August, amended by Law No. 15/2022, of 19 December – Mining Law	Establishes the general principles governing the exercise of rights and duties relating to the use and exploitation of mineral resources, including mineral water. Its objective is to regulate the use and exploitation of mineral resources in harmony with the best and safest socio-environmental mining practices and transparency, with a view to long-term sustainable development.	Any mining project must respect all environmental protection and safety measures established in this legislation.
Decree No. 31/2015 of 31 December - Regulation of the Mining Law, amended by Decree 48/2022 of 13 October	The Regulation of the Mining Law does not introduce drastic changes to the mining exploitation regime but brings important new elements, notably the need for registration with the National Directorate of Geology and Mines of the mining operators contracted by the mining titleholder for the exercise of mining operations.	The Proponent must ensure that all its subcontractors comply with the current legislation for the activity.
Ministerial Diploma No. 189/2006, of 14 December - Basic Environmental Management Standards for Mining Activity	These standards aim to minimise environmental damage and negative socio-economic impacts resulting from Level I mining activities. They also aim to ensure that mining activities are conducted using simple methods that avoid air, soil, and water pollution and do not significantly affect fauna and flora, nor compromise human health.	The Proponent must ensure that the project complies with the basic environmental management standards and that these minimise the potential impacts of mining activities.
Decree No. 21/2014, of 16 May - Corporate Social Responsibility Policy for the Extractive Industry of Mineral Resources	Establishes a guiding framework for the implementation of actions within the scope of social responsibility in the industrial sector, setting objectives, guiding principles, and targets to be achieved	The project must respect the guiding principles present in this legislation

Legislation	Description	Relevance
Decree No. 61/2006, of 26 December - Technical Safety and Health Regulation for Geological Mining Activities	Definition of measures intended to guarantee the safety and health conditions of workers, in the performance of their duties in mining operations, including the application of technical accident prevention measures, occupational risks, and hygiene in the workplace, where mining activities are carried out.	The Project must guarantee all safety and hygiene conditions throughout its production process.
PETROLEUM ACTIVITIES		
Decree No. 56/2010, of 22 November - Environmental Regulation for Petroleum Operations	Defines the EIA process for petroleum operations. Defines the categories and the level of environmental assessment required for petroleum activities as follows: Category A: activities related to development and production, construction and operation of pipeline systems, decommissioning and other activities in sensitive ecosystems and conservation areas; Category B: activities related to research activities, except in conservation areas and sensitive ecosystems; Category C: activities that, by their nature, do not cause negative impacts on the environment and public health.	Any project must be submitted to a formal EIA process, in accordance with this regulation. An environmental licence must be obtained from MAAP and the issuance of this licence precedes any other licence or authorisation required for the Project.
Law No. 21/2014, of 18 August amended by Law No. 16/2022 of 19 December - Petroleum Law	Establishes the regime for granting rights for carrying out oil and gas operations in the country and includes aspects related to Environmental Safety and Protection and the disposal of polluted water and oil and gas waste. Article 57 on "Protection of natural resources" establishes that the investor must ensure the coexistence of their Project with marine fauna and other ecosystems, especially in conservation and fishing development areas. Article 66, concerning "protection and safety of the environment", establishes that, in addition to carrying out petroleum operations in accordance with good petroleum industry practices, holders of prospecting, exploration and production licences, construction, installation and operation of infrastructure and pipeline systems, must carry out petroleum operations in accordance with environmental and other applicable legislation. This serves to ensure that no ecological damage or destruction is caused by oil-related operations and that, where unavoidable, environmental protection measures are in accordance with internationally accepted standards. The latter is achieved through the development and submission of environmental impact studies, including adequate mitigation measures to the responsible entities.	Any petroleum project must comply with all environmental protection and safety measures established in this legislation.
Decree No. 34/2015 of 31 December - Regulation for Petroleum Operations	Establishes operational requirements, including aspects related to safety, health and environmental protection, and presents a list of environmental issues to be considered during petroleum operations.	Any petroleum project must consider safety, health, and environmental protection.
Decree No. 80/2020 of 18 September – Regulation for the Licensing of Petroleum	Establishes the rules and procedures for the licensing of construction, installation, alteration, replacement, operation, and decommissioning of Petroleum Infrastructures, including Storage and the exercise of	Environmental Licensing is one of the requirements for the Installation Licence for wells and other Petroleum Infrastructures.

Legislation	Description	Relevance
Infrastructure and Operations	Transport by Circulating Means, as well as authorisations by registration.	
MARINE ACTIVITIES AND FISHERIES		
Resolution No. 39/2017 of 14 September - Maritime Policy and Strategy (POLMAR)	Establishes a policy for the use of the sea and a strategy for the implementation of this policy, in order to ensure that the multiple uses of maritime and coastal areas are developed in an orderly and sustainable manner. The proposed strategy is divided into seven pillars, one of which is economic development. Within the scope of this pillar, the strategy establishes political guidelines for various economic sectors, which the Government of Mozambique must facilitate and promote, including the minerals and hydrocarbons sector. For the minerals and hydrocarbons sector, the adopted political lines serve to ensure knowledge of the country's potential in terms of mineral and hydrocarbon resources, and to monitor and control mineral and hydrocarbon exploration activities, to protect human life and marine and coastal environments. The policy was developed due to a growing demand for maritime space for different purposes, such as fishing and aquaculture, maritime transport and naval industry, tourism, energy production, hydrocarbon exploration, research and scientific investigation, and safeguarding cultural heritage, which requires a holistic and integrated approach. POLMAR therefore aims to respond to the demand for coastal and marine areas for the development of a profitable and sustainable blue economy.	The project must ensure that it follows the principles described in this Policy.
Law No. 20/2019, of 8 November - Maritime Law	Amends Law No. 4/96, of 4 January - Maritime Law. It aims to establish the legal regime applicable to the exercise of sovereign powers and jurisdiction over national maritime space, the exploitation of living and non-living marine resources, as well as the use of the maritime public domain. Defines the rights of jurisdiction over the strip of sea along the Mozambican coast and establishes rules for administrative regulations and maritime activities.	This law defines the rights in territorial waters and all maritime activities must respect its provisions.
Resolution No. 63/2024, 15 November - Approves the National Maritime Spatial Planning Plan (POEM)	The national maritime spatial planning aims for the following strategic objectives: i. enhance territorial planning and management and strengthen monitoring, enforcement, and accountability in the development and implementation of plans; ii. ensure the integration of the Green-Blue Economy and the green growth agenda into national development priorities, ensuring the conservation of ecosystems, biodiversity, and the sustainable use of natural resources; iii. strengthen the capacity for environmental quality assessment and monitoring, especially in areas where development projects are implemented; iv. promote studies and research aimed at reducing disaster risk and adapting to climate change;	The project must ensure its alignment with the POEM and compliance with the zoning and planning established by this plan, as well as the management rules for maritime space.

Legislation	Description	Relevance
	v. reduce the vulnerability of communities, the economy, and infrastructure to climate risks and natural and anthropogenic disasters.	
Decree No. 21/2017, of 24 May - Regulation establishing the Legal Regime for the Use of National Maritime Space	Establishes the mechanisms for the planning and management of the National Maritime Space, setting rules for the development of marine spatial plans, private use of the sea and coastal areas, taxation of private use of the sea, and technical monitoring and evaluation of maritime spatial plans.	Currently, there is no maritime spatial plan for the Project area. If, in the future, a maritime spatial plan is developed for the Project area, the Project activities will have to comply with the usage rules established in such a plan (e.g., any navigation corridor that may be established).
Decree No. 35/2007 of 14 August - Regulation on Commercial Maritime Transport	Seeks to regulate Commercial Maritime Transport in its three categories: International Maritime Transport, National Cabotage, and Local Traffic.	As this project involves the international maritime transport of cargo, MRV must consider and comply with the requirements of this decree.
Fisheries Law - No. 22/2013, of 1 November	Defines the conservation areas for marine species, which consist of national marine parks, nature reserves, and protected marine areas. The law provides for the establishment of a list of protected species.	The Project must ensure that no protected marine species are affected by the proposed activities.
Regulation of Maritime Fishing - Decree No. 89/2020 of 8 October	Provides a list of aquatic species placed under special protection, in whole or in part, and specific conditions applicable to each. In addition to the preservation and protection of marine species, it provides for the establishment of fishing zones, types of fishing, fishing gear, fishing vessels, and fishing safety and security.	The project must aim to ensure that maritime fishing is not affected by the proposed activities.
Regulation of Recreational and Sport Fishing - Decree No. 82/2021 of 15 October	Regulates the practice of recreational and sport fishing in the territorial waters of Mozambique. Annex II of the regulation contains a list of protected species.	The project must aim to ensure that recreational and sport fishing are not affected by the proposed activities.
Regulation for the Prevention of Pollution and Protection of the Marine and Coastal Environment - Decree 45/2006 of 30 November	Provides measures aimed at preventing and limiting pollution of the marine and coastal environment by illegal discharges from ships, platforms, and other offshore sources, as well as from land-based sources, and establishes a legal basis for the protection and conservation of areas that constitute the public maritime domain, including coastal lakes, rivers, beaches, and fragile ecosystems. It stipulates that offshore discharges must comply with applicable international guidelines, namely MARPOL 73/78.	The project must ensure that all measures are in place to prevent marine and coastal pollution. This regulation requires the project to have an emergency plan for pollution by oils and other harmful or dangerous substances. This contingency plan must be approved by INAMAR in coordination with MAAP.
ATMOSPHERIC EMISSIONS AND AIR QUALITY		
Law No. 20/1997 – Environmental Law	Article 9 prohibits the discharge of any toxic substances into the atmosphere, in excess of legal limits. Emission standards are defined by Decree No. 18/2004 (see below).	The Project must comply with ambient air quality and atmospheric pollutant emission standards, so as not to cause damage to the environment.
Decree No. 18/2004 (amended by Decree No. 67/2010) - Regulation on Environmental Quality Standards and Effluent Emission	Establishes parameters for air quality maintenance (Article 7), gaseous pollutant emission standards by industry type (Article 8), and gaseous pollutant emission standards from mobile sources (Article 9), including light and heavy vehicles.	

Legislation	Description	Relevance
Resolution No. 78/2009 of 22 December - Regulation on the Management of Ozone-Depleting Substances,	This regulation prohibits the import, export, production, sale, and transit of ozone-depleting substances, including: Chlorofluorocarbons (CFCs); Halogenated substances (Halon-1211, Halon-1301, and Halon-2402); Carbon tetrachloride (CCL4); and Other substances defined by the Montreal Protocol as Ozone-Depleting Substances.	The Project shall comply with the decree's requirements, the EIA analysed and took into account the project's particularities compared to the Directive's requirements, and the PGA includes measures that the proponent must implement to ensure compliance in the different project phases.
WATER RESOURCES AND WATER QUALITY		
Law No. 16/91 – Water Law	This law is based on the principle of public water use, water management based on river basins, and the polluter-pays and user-pays principles. It aims to ensure ecological and environmental balance. The use of water requires either a concession (permanent or long-term uses) or a licence (short-term uses). Licences are valid for renewable periods of 5 years, while concessions are valid for renewable periods of 50 years. Article 54 states that any activity with the potential to contaminate or degrade public waters is subject to a special authorisation to be issued by the Regional Water Administration and to the payment of a fee.	. Should the Project require abstraction of water from natural water bodies (e.g., for concrete production), obtaining a licence from the competent authority (Regional Water Administration) will be necessary. Should the Project require the discharge of effluents into water bodies (such as in camps), a licence must be obtained for this purpose. The EIA process assessed potential impacts associated with potential water contamination
Decree No. 98/2024 of 30 December – Regulation on Public Water Supply and Wastewater Drainage Systems	Defines the technical and operational conditions that public water supply and wastewater drainage systems in Mozambique must adhere to, including faecal sludge management, to ensure their proper functioning, preserving public health and the safety of users, facilities, and the environment.	Considering that the proposed project includes water supply and wastewater disposal, it must comply with the regulation that defines a set of technical conditions for water supply and wastewater drainage systems.
Decree No. 18/2004 of 2 June – Regulation on Environmental Quality Standards and Effluent Discharge, amended by Decree No. 67/2010 of 31 December	Determines that, when industrial effluents are discharged into the environment, the final discharged effluents must comply with the discharge standards as established in Annex III of the decree. Domestic effluent discharges must comply with the discharge standards as established in Annex IV. The regulation defines environmental quality and effluent discharge standards for receiving bodies, technologies, systems, and treatment methods.	The Project must respect the effluent emission limits established in this regulation. This may apply to any effluent emissions related to the project.
Decree No. 18/2012, of 5 July - Regulation on Groundwater Research and Exploration, approved	Establishes the set of norms and procedures to which the licensing for the research, drilling, and exploitation of groundwater must adhere, and the criteria to be observed in the opening of boreholes, wells, and other groundwater abstraction works.	The present project does not foresee the opening of groundwater abstraction boreholes, but must adhere to all requirements for the licensing of groundwater use, if necessary.
Decree No. 50/2017 of 2 October - Regulations on the Safety of Tailings Dams	Establishes mechanisms and criteria for the control of the safety of tailings dams, rules for the coordination of activities between the different entities involved in their control, and requirements for the design, construction-operation, and closure of these infrastructures.	The project does not foresee the construction of tailings dams.
Decree No. 52/2023, of 30 August – Regulations on Raw Water Quality	Establishes the norms that define the standards for raw water quality and effluent discharge, setting the maximum permissible levels of pollutant concentration in surface and groundwater resources.	The project must ensure that all activities resulting in liquid and solid effluent discharges comply with the quality standards and authorisation

Legislation	Description	Relevance
Standards and the Discharge of Liquid and Solid Effluents	It also defines the conditions for authorising effluent discharge and monitoring mechanisms.	norms established by this regulation. Furthermore, it must guarantee the implementation of effluent control and treatment measures to minimise environmental impacts.
POLLUTION AND WASTE MANAGEMENT		
Law No. 20/97 – Environmental Law	Limits the production and/or deposition of any toxic or polluting substances into water or atmosphere, and prohibits any activities that may accelerate erosion, desertification, deforestation, or any other form of environmental degradation, beyond the limits established by law (Article 9).	The Project must include measures to prevent pollution throughout its lifecycle, practising, as far as possible, the 3 Rs – Reduce, Reuse, and Recycle. The EIA includes mitigation measures, monitoring, and recommendations aimed at complying with these requirements.
Penal Code, Decree No. 35/2014 of 31 December	Pollution is considered inadmissible whenever the nature or values of pollutant emissions violate the guidelines or limits imposed by the competent authority in accordance with the provisions of legal and regulatory provisions, with companies or other similar entities being jointly and severally liable for the payment of the fine and for the remediation of the damages caused.	The Project must include measures to prevent pollution throughout its lifecycle, practising, as far as possible, the 3 Rs – Reduce, Reuse, and Recycle. The EIA includes mitigation measures, monitoring, and recommendations aimed at complying with these requirements
Decree No. 94/2014 - Regulations for the Management of Urban Solid Waste	Establishes the legal framework for the management of urban solid waste. The key objective is to establish rules for the production, collection, and disposal of urban solid waste, in order to minimise its impacts on public health and the environment. Solid waste, according to this decree, is classified according to Mozambican Standard NM339 – Solid Waste – Classification. All public and/or private entities carrying out urban solid waste management must produce and implement an integrated urban solid waste management plan that they manage, including, at a minimum, the information contained in Annex I of the regulation. Waste management is the responsibility of the Municipal Councils and District Governments, within their respective jurisdictions.	The final disposal of urban solid waste must comply with the operational rules established by the Ministry responsible for the Environment and must be carried out in sanitary landfills. All facilities intended for the treatment and final disposal of urban solid waste are subject to prior environmental licensing in accordance with the EIA Regulation.
Decree No. 83/2014 - Regulation for the Management of Hazardous Waste	Establishes the legal framework for the management of hazardous waste. The key objective is to establish rules for the production, collection, and disposal of hazardous waste, in order to minimise its impacts on public health and the environment. Annex IX of this decree contains waste classifications.	All facilities and equipment for preliminary storage, transport, disposal, treatment, recovery, or elimination of hazardous waste are subject to prior environmental licensing, in accordance with the EIA Regulation. Operators and transporters of hazardous waste must be certified by MAAP; the certificate application must be made in accordance with Annex I of the regulation. All public and/or private entities carrying out hazardous waste management activities must, before commencing the activity, prepare a hazardous waste management plan, including, at a minimum, the information contained in Annex II of the regulation.

Legislation	Description	Relevance
Decree No./2003, of 18 February - Regulation on Biomedical Waste Management	This regulation establishes specific guidelines for the segregation, storage, transport, and final disposal of biomedical waste, which may include materials potentially contaminated with pathogens. It defines categories of biomedical waste and requires adequate identification of containers and receptacles for such waste, as well as training and protection for personnel involved in its handling.	The proponent must comply with the requirement to create biomedical waste management plans by healthcare facilities, detailing specific procedures for handling such waste.
BIODIVERSITY		
Law No. 20/97 – Environmental Law	Articles 12 and 13 define that the planning, implementation, and operation of projects must ensure the protection of biological resources, particularly species of flora and fauna threatened with extinction or requiring special attention, due to their genetic, ecological, cultural, or scientific value. This aspect extends to their habitats, especially those present in environmental protection areas.	The Project must consider protected biodiversity. The presence of potential relevant biodiversity values in the Project area must be assessed in the EIA.
Law No. 16/2014 as amended by Law No. 5/2017 – Law on the Protection, Conservation, and Sustainable Use of Biological Diversity, and its respective Regulation, Decree No. 89/2017	This law establishes the basic principles and norms for the protection, conservation, restoration, and sustainable use of biological diversity within national territory, particularly in conservation areas. Article 11 of the Regulation establishes that cultural and natural monuments must be conserved. These include areas with one or more unique aesthetic, geological, religious, historical, or cultural values that, given their rarity, must be conserved. Natural monuments may include trees of ecological, aesthetic, historical, and cultural value. Article 16 defines that all activities that may result in alterations to vegetation cover, or that may degrade flora, fauna, and ecological processes to the point of compromising their maintenance, are prohibited within natural parks, unless necessary for scientific or management reasons.	No conservation area, as defined by this diploma, is interfered with by the proposed Project. If any cultural or natural monument is identified within the project area, adequate measures for its protection and conservation are required. This aspect is evaluated in the EIA, in the specialised Socioeconomics study.
Law 17/2023, of 29 December – Forest Law	Establishes the principles, objectives, and norms regarding the creation, protection, conservation, access, use, enhancement, and oversight of the national forest heritage for the ecological, social, cultural, and economic benefit of present and future generations.	The Project shall consider the protection of forest heritage, including forest conservation areas and protected trees.
Decree No. 51/2021 - Regulation for the Protection, Conservation, and Sustainable Use of Avifauna.	This decree regulates the protection, conservation, and sustainable use of avifauna, including their natural habitats, continental, marine, lacustrine, and fluvial. Article 5 defines as avifauna protection zones “Key Biodiversity Areas” and “Important Bird Areas”, and Article 4 prohibits the exercise of any activity or construction of infrastructure likely to disturb avifauna or its habitat in protection areas, as well as any economic or social infrastructure to be erected in sensitive areas for birds, which must comply with international best practice standards, ensuring the placement of signalling devices to prevent bird collisions, or any other damage affecting avifauna. Appendices A and D define protected species, whose exploitation is not permitted; Appendix B defines the avifauna species in Mozambique included in CITES.	The Project must consider protected avifauna as well as their habitats. The presence of potential relevant avifauna values in the Project area, namely “Key Biodiversity Areas” and “Important Bird Areas”, must be evaluated in the EIA.

Legislation	Description	Relevance
Regulation for the Control of Invasive Alien Species, Decree No. 25/2008 of 1 July	Article 8 of this decree prohibits activities involving invasive alien species without prior authorisation and states that 'after consulting the Interinstitutional Group for the Control of Invasive Alien Species, the National Environmental Authority (MAAP) may prohibit any activity that, by its nature, may imply the propagation of invasive alien species'. The activities include the following: Importation of any type of invasive alien species, whether by sea, land, or air; Possession of any type of invasive alien species; Development, breeding, or otherwise propagation of any type of invasive alien species; and Transport, movement, or relocation of any type of invasive alien species	The Project shall ensure the control of the propagation of invasive alien species. Article 11 of the decree suggests that adequate methods should be implemented to control and eradicate invasive alien species. The present EIA includes mitigation measures for potential impacts related to invasive alien species, which must be binding and ensure compliance with the Regulation's requirements by the proponent.
Ministerial Diploma No. 55/2022 of 19 May – Directive on Biodiversity Offsets	Establishes the principles, methodologies, requirements, and procedures for the correct implementation of Biodiversity Offsets, integrated into EIA processes. It defines that whenever significant negative residual impacts on biodiversity exist or are foreseeable, the preparation of biodiversity offset management plans is mandatory.	No significant negative residual impacts on biodiversity resulting from the Project have been identified, therefore this directive does not apply.
CULTURAL HERITAGE		
Law No. 10/88 – Cultural Heritage Law	It aims to protect tangible or intangible cultural heritage. Cultural heritage is defined in this law as the "set of tangible and intangible assets created or integrated by the Mozambican people throughout history, with relevance for the definition of Mozambican cultural identity." Tangible cultural assets include: monuments, groups of buildings (with historical, artistic, or scientific relevance), places or sites (of archaeological, historical, aesthetic, ethnological, or anthropological interest), and natural elements (physical and biological formations of particular interest from an aesthetic or scientific point of view).	The potential presence of cultural heritage in the Project area must be assessed in the EIA. During the construction of the Project, archaeological objects may also be found. If this happens, the Proponent must immediately report the finding to the relevant cultural heritage institution.
LABOUR AND SAFETY		
Law No. 13/2023, of 25 August - Labour Law	This law applies to legal relationships of subordinate employment established between employers and national and foreign workers, in all industries operating in the country. Chapter VI establishes the principles of worker safety, hygiene, and health.	The Proponent must provide its workers with good hygiene, health, and safety conditions, inform them about the risks of their work, implement mitigation measures and contingency plans associated with the project, and ensure continuous worker awareness and education, and the availability of PPE.
Law No. 19/2014 Law for the Protection of Persons, Workers and Job Applicants with HIV/AIDS	This law establishes the general principles aimed at ensuring that all employees and job applicants are not discriminated against in the workplace or when applying for jobs, due to being suspected of, or having, HIV/AIDS. Article 47 establishes that workers and job applicants must not be discriminated against in their employment rights, training, promotion, and career advancement, by virtue of being HIV positive. Article 52 prohibits the requirement of HIV tests when applying for jobs, for maintaining employment, for	Conducting HIV/AIDS tests on job applicants is prohibited. Testing workers without the worker's consent is also prohibited. The Proponent must train and reorient all HIV-positive workers who are capable of performing their duties at work, to carry out activities compatible with their capabilities.

Legislation	Description	Relevance
	access to training, or for qualification for promotion or any other work activity.	
Decree No. 45/2009 – Regulation on General Labour Inspection	This regulation establishes the rules relating to inspection activities, within the scope of controlling the legality of labour. Point 2 of Article 4 provides for employer responsibilities regarding the prevention of occupational health and safety risks for the employee.	The Proponent must comply with all legislative requirements. In the event of an inspection, the proponent must adopt a collaborative stance and provide all information requested by the inspectors for the performance of their duties.
Regulation of the Legal Regime for Work Accidents and Occupational Diseases, Decree No. 62/2013 of 4 April	It establishes norms and principles relating to the prevention of work accidents and occupational diseases and the necessary measures when they occur, and presents the following: - The express obligation of the employer to ensure coverage of insurance for work accidents and occupational diseases through insurers legally authorised to operate in Mozambique. The employer may also offer supplementary insurance that is more favourable to their employees; - The increase in the subsidy for employees who are victims of accidents, or for their beneficiaries in case of fatality; - The funeral allowance is now fixed at 2 times the minimum wage of the deceased worker's sector of activity; - Periodic updating, by the competent authority, of the allowances provided for in the regulation whenever there is a variation in the national minimum wage, so as not to be less than 60% of the national minimum wage applicable to the injured employee's sector of activity; - The possibility for the employer to contract an insurance company to provide insurance covering pensions, when occupational accident and occupational disease insurance does not exist (or is insufficient), in cases where employers are obliged to guarantee pension payments; - The need to update the work accident benefit established before the regulation came into force to at least 60% of the lowest minimum wage.	The Proponent must provide its workers with good hygiene, health, and safety conditions, inform them about the risks of their work, and ensure compliance with this Regulation. The PGA contains provisions related to potential impacts of occupational accidents and occupational diseases.
Law 3/2022 of 10 February – Law establishing the Mechanisms for Health Protection and Promotion, Disease Prevention and Control, as well as Threats and Risks to Public Health.	Establishes the mechanisms for health protection and promotion, disease prevention and control, as well as threats and risks to Public Health. Applies to the bodies and institutions of Public Administration, citizens, and other natural or legal persons, public or private, that contribute to health promotion, disease prevention and control, and the preservation of Public Health. Identifies risks to Public Health, disease prevention and control measures, water and food protection measures, and sanitation and waste management measures.	The Project must identify environmental risks with an impact on Public Health and propose measures for their prevention and mitigation. The Project must also safeguard the Public Health prevention and protection measures referred to in this diploma.

2.8 International Best Practice Standards and Guidelines

The recommended practices and international guidelines for offshore seismic acquisition are comprehensive and aim to ensure the safety, efficiency, and sustainability of seismic operations, while minimising environmental impacts.

Table 2-2: International Legal and Regulatory Framework applicable to seismic vessels

Guidelines and Standards Applicable to Offshore Seismic Acquisition		
IOGP (International Association of Oil and Gas Producers)		
IOGP Report 423	*HSE Management — Guidelines for Working Together in a Contract Environment*	Reference guideline for the management of Health, Safety, and Environment (HSE) risks in contracted activities in the oil and gas industry. It describes an eight-phase process for the contractual cycle: planning, capability assessment, tender and award, pre-mobilisation, mobilisation, execution, demobilisation, and final evaluation. It includes emphasis on risk management, definition of assurance mechanisms (verification of barriers and controls), and interface between the client's and contractor's HSE management systems. Applicable to the HSE contractual framework between the operator and the seismic contractor, being complemented by IOGP Report 432 for geophysical operations.
IOGP Report 432 (November 2017)	*Managing HSE in a Geophysical Contract*	Provides a framework of best practices and standardisation in HSE management of geophysical operations, including marine seismic acquisition. It covers occupational health and safety, asset integrity, social responsibility, and environmental aspects of geophysical contracts. Intended for all parties involved in a geophysical operations contract: clients, contractors, and subcontractors. Includes supporting tools: Table 1 — Guidelines for minimum HSE Management System expectations; and Table 2 — Minimum expectations for the control of specific risk areas. Covers onshore, marine, and transition zone operations.
ISO (International Organization for Standardization)		
ISO 19901-10:2021	*Petroleum and Natural Gas Industries — Specific Requirements for Offshore Structures — Part 10: Marine Geophysical Investigations*	International standard that establishes requirements and guidelines for marine geophysical investigations. Applicable to operators, contractors, and regulatory authorities. Covers: objectives, planning, and quality management; positioning; seabed mapping (instrumentation, acquisition parameters, and methods); sub-seabed mapping (seismic instrumentation and non-seismic methods); reporting; data integration, interpretation, and geo-hazard investigation. Applicable from shallow coastal waters to depths exceeding 3,000 m.
IFC (International Finance Corporation — World Bank Group)		
IFC EHS Guidelines for Offshore Oil and Gas Development (June 2015)	*Environmental, Health, and Safety Guidelines for Offshore Oil and Gas Development*	Reference technical document with examples of Good International Industry Practice (GIIP), used by the IFC in project evaluation and approval. Specifically covers seismic exploration, including detailed measures for underwater noise mitigation: Identification of sensitive areas (feeding, breeding, spawning) Campaign planning to avoid biologically sensitive periods Monitoring with experienced observers before and during operations Minimum standoff of 500 m from marine mammals before commencement Use of soft-start (gradual increase in sound pressure) Use of the lowest practicable power levels Reduction/attenuation of high-frequency noise Explicitly references JNCC (2010) guidelines and IAGC/IOGP publications.

Guidelines and Standards Applicable to Offshore Seismic Acquisition		
JNCC (Joint Nature Conservation Committee — UK)		
JNCC Guidelines for Minimising the Risk of Injury to Marine Mammals from Geophysical Surveys (August 2017; revised version under consultation 2025)	JNCC Guidelines for Minimising the Risk of Injury to Marine Mammals in Geophysical Surveys	International reference guidelines for the protection of marine mammals (cetaceans and seals) during geophysical surveys, including seismic acquisition with air-guns and sub-bottom profilers. Key measures: Mitigation zone: minimum radius of 500 m (or greater if the permanent threshold sound level — PTS — injury zone exceeds this distance); additional 2,000 m zone under certain circumstances Marine Mammal Observers (MMO): visual monitoring before and during operations, with standardised recording forms Passive Acoustic Monitoring (PAM): complementary to visual monitoring, especially in low visibility conditions (PAM guidance published December 2023) Mandatory soft-start: gradual increase in sound power before reaching full operational capacity Pre-shot survey: minimum of 30 minutes of visual/acoustic monitoring before soft-start begins Minimum delay of 20 minutes after last marine mammal detection in the mitigation zone Precautionary approach when evidence of risk is insufficient Mandatory MMO report submitted to the regulator after each campaign Although developed for the UKCS, JNCC does not object to their use in other territories, encouraging adaptation to local circumstances. The 2025 version under consultation introduces considerations for alternative low-light visual monitoring technologies.
CBD (Convention on Biological Diversity)		
CBD Technical Series No. 99 (2022); COP Decisions X/29, XI/18, XII/23, XIII/10; EBSA Process (COP Decision IX/20)	Review of the Impacts of Anthropogenic Underwater Noise on Marine Biodiversity and Approaches to Manage and Mitigate Them; EBSA Criteria	The CBD addresses anthropogenic underwater noise and the protection of marine biodiversity through two pathways: 1) Underwater Noise: Technical Series No. 99 synthesises knowledge on physical, perceptual and behavioural impacts of underwater noise on marine mammals, reptiles, fish, diving birds and invertebrates. COP decisions encourage Parties to take measures to avoid, minimise and mitigate significant adverse impacts of noise, including from seismic surveys, and to conduct impact assessments and monitoring. 2) EBSA Process: Identification of Ecologically or Biologically Significant Marine Areas based on 7 scientific criteria adopted at COP 9 (2008): rarity, importance for life cycles, threatened species, vulnerability, biological productivity, biodiversity and naturalness. EBSA descriptions provide scientific information but do not prescribe management measures – these are the responsibility of States and intergovernmental organisations.
IMO — MARPOL (International Convention for the Prevention of Pollution from Ships)		
MARPOL Annex IV (in force since 27 September 2003)	Prevention of Pollution by Sewage from Ships	Establishes requirements for controlling the discharge of sewage from ships into the sea. Discharge is prohibited except when: the ship operates an approved treatment plant; discharges comminuted and disinfected sewage at more than 3 nautical miles from the coast; or discharges untreated sewage at more than 12 nautical miles from the coast. Requires onboard treatment systems or retention for safe disposal ashore.
"MARPOL Annex V (in force since 31 December 1988; revised in 2011)"	Prevention of Pollution by Garbage from Ships	Prohibits the discharge of all kinds of garbage into the sea, except under specific circumstances. The most prominent prohibition is the total ban on discharging plastics into the ocean. It specifies distances from the coast for disposal of different types of waste and stricter requirements in "special areas". The 2011 revision strengthened the prohibitions.
"MARPOL Annex VI	Prevention of Air Pollution from Ships	"Establishes limits for emissions of sulphur oxides (SOx) and nitrogen oxides (NOx) from ship exhausts and prohibits deliberate emissions of ozone-depleting substances. Main requirements:

Guidelines and Standards Applicable to Offshore Seismic Acquisition		
(in force since 19 May 2005; revised in 2008 and 2011)"		Global sulphur content limit in fuel: 0.50% m/m (since 2020); 0.10% m/m in Emission Control Areas (ECAs) NOx emission limits for marine diesel engines with a power output > 130 kW, in three tiers (Tier I, II, III) depending on the date of construction Prohibition of emissions of ozone-depleting substances Requirement for International Air Pollution Prevention Certificate (IAPP) Regulation of onboard incineration Chapter on energy efficiency (EEDI/SEEMP) for greenhouse gas reduction, adopted in 2011"

3 GLOBAL EIA METHODOLOGY

3.1 Framework and Objective of the Chapter

This chapter describes the global methodology adopted for the Environmental Impact Assessment (EIA) process of the 3D Marine Seismic Acquisition Project in areas AS8 and AS7, in an offshore environment. Its objective is to establish a clear, coherent, and defensible methodological basis for understanding the sequence of the environmental licensing process, the main technical outputs associated with each phase, and how environmental, socioeconomic, and public participation information will be progressively integrated into the decision-making process.

The methodology presented reflects the structure applicable to projects classified as Category A, under the Mozambican EIA regime, which structures the process into three main stages: Process Instruction and Categorisation, EPDA Phase, and EIA Phase. This structure is adapted to the present Project, which does not involve physical resettlement or land acquisition, with the expected potential socioeconomic effects being primarily associated with temporary interactions with maritime space use, namely fishing, navigation, maritime safety, and related coastal activities.

This chapter does not describe or replace the Terms of Reference for the EIA. The ToR constitute a specific output of the EPDA phase and are presented further on in the EPDA Report, where the scope of the specialist studies, the issues to be addressed, and the specific methodological requirements for the EIA phase are defined. This chapter only presents the general logic of the process, including how the results of the EPDA phase will be used to guide the subsequent EIA phase.

EIA is understood as a preventive decision-support instrument, intended to identify, predict, assess, and manage the potential effects of proposed activities on the physical, biological, socioeconomic, and cultural environment, before the implementation of the Project.

3.2 Legal Framework of the Methodology

The EIA methodology is based, firstly, on Law No. 20/97, of 1 October, the Environment Law, which establishes the general principles for the protection, conservation, and sustainable use of the environment, as well as the obligation to subject activities likely to cause significant environmental impacts to environmental assessment.

The process is regulated by Decree No. 54/2015, of 31 December, which approves the Regulation on the Environmental Impact Assessment Process. This diploma defines the scope of application of the EIA process, project categorisation, the environmental authority's competences, process instruction requirements, pre-assessment, the preparation of environmental studies, and the procedures associated with the issuance of the Environmental Licence. For oil and gas sector activities, the methodology will be articulated with the applicable sectoral environmental regulations, insofar as they define specific requirements for offshore petroleum activities.

Ministerial Diploma No. 129/2006, of 19 July, which approves the General Directive for Environmental Impact Studies, serves as a methodological reference for the structure and content of the EIA. This directive establishes that the EIA must be integrated into the activity's lifecycle and must provide sufficient technical information to support the decision on the project's environmental viability, including the description of the activity, the characterisation of the baseline situation, the analysis of alternatives, the identification and assessment of impacts, the definition of mitigation measures, risk analysis, the PGA, monitoring programmes, conclusions, and knowledge gaps.

Ministerial Diploma No. 130/2006, of 19 July, which approves the General Directive for Public Participation in the EIA Process, frames the methodology for the involvement of Interested and Affected Parties (I&APs), including the identification of relevant parties, the provision of information, the holding of consultation meetings, the recording of comments, the preparation of responses, and the integration of public participation results into the environmental decision-making process.

The application of these instruments does not imply the full reproduction of their respective requirements in this chapter. Their role, at this stage, is to frame the methodological sequence of the process and ensure that the development of the EPDA, EIA, and PGA respects the structure, minimum content, and procedures required by Mozambican legislation.

3.3 Methodological Guiding Principles

The adopted methodology follows a preventive, integrated, and phased approach. Preventive, because it seeks to identify risks and impacts before the implementation of activities; integrated, because it considers physical, biological, socioeconomic, and cultural components together; and phased, because it accompanies the evolution of the process from initial scoping to detailed assessment and the definition of management measures.

The scope of the EIA will be proportional to the nature of the Project and the sensitivity of the potentially affected environmental and social receptors. Thus, the assessment is not limited to the description of seismic acquisition activities but considers the interactions of these activities with existing uses of the maritime space, the receiving environmental conditions, the presence of sensitive species and habitats, fishing activities, maritime navigation, underwater cultural heritage, and risks associated with accidental scenarios.

The methodology considers the environmental management hierarchy, prioritising the prevention and minimisation of impacts at the source. When integral prevention is not technically possible, mitigation, management, monitoring, and, if applicable, compensation measures will be defined, compatible with national legislation and the Project's operational conditions.

Public participation is treated as a cross-cutting component of the process, not as an accessory stage. Information collected from I&APs will be used to improve the definition of the area of influence, identify relevant uses of the maritime space, characterise local and institutional concerns, and adjust, when necessary, the assessment of impacts and the proposed management measures.

3.4 General Sequence of the EIA Process

For projects classified as Category A, the EIA process is developed in a phased manner. In the first phase, the proponent initiates the process with the Environmental Authority, presenting the necessary information for pre-assessment and categorisation. Once the project category is confirmed, the EPDA phase follows, aiming to identify relevant environmental and social issues, potential fatal flaws, preliminary areas of influence, relevant alternatives, and matters that warrant further investigation in the EIA. The EPDA phase culminates with the submission of the EPDA Report, including the ToRs for the EIA, for appraisal and approval by the Environmental Authority.

Following the approval of the EPDA and ToRs, the EIA phase begins. In this phase, specialist studies are carried out, the baseline situation is updated and deepened, potential and residual impacts are assessed, mitigation and management measures are defined, and an Environmental Management Plan is prepared. The EIA phase includes a second round of public participation, allowing for the appraisal of the assessment results and the incorporation of comments before final submission to the Environmental Authority.

No physical resettlement, displacement of housing, land acquisition, or permanent loss of access to land assets is foreseen in the present Project. For this reason, the EIA process does not integrate a Resettlement

Plan component. However, the absence of resettlement does not eliminate the need to assess, within the scope of the EIA, any temporary interferences with economic activities and uses of the maritime space, especially artisanal fishing, semi-industrial or industrial fishing, navigation, tourism, and coastal support activities. These matters will be treated as impactsocioeconomic and maritime space use, with prevention, communication, operational coordination, and claim management measures mations proportional to the identified risk.

A Figure 3-1 summarises the sequential and iterative logic of the EIA process, demonstrating that environmental assessment does not constitute an isolated act, but a progressive process of analysis, consultation, review, and decision-making, aimed at supporting environmental decision-making and ensuring that the Project, if approved, is implemented with adequate prevention, mitigation, monitoring, and environmental management measures.

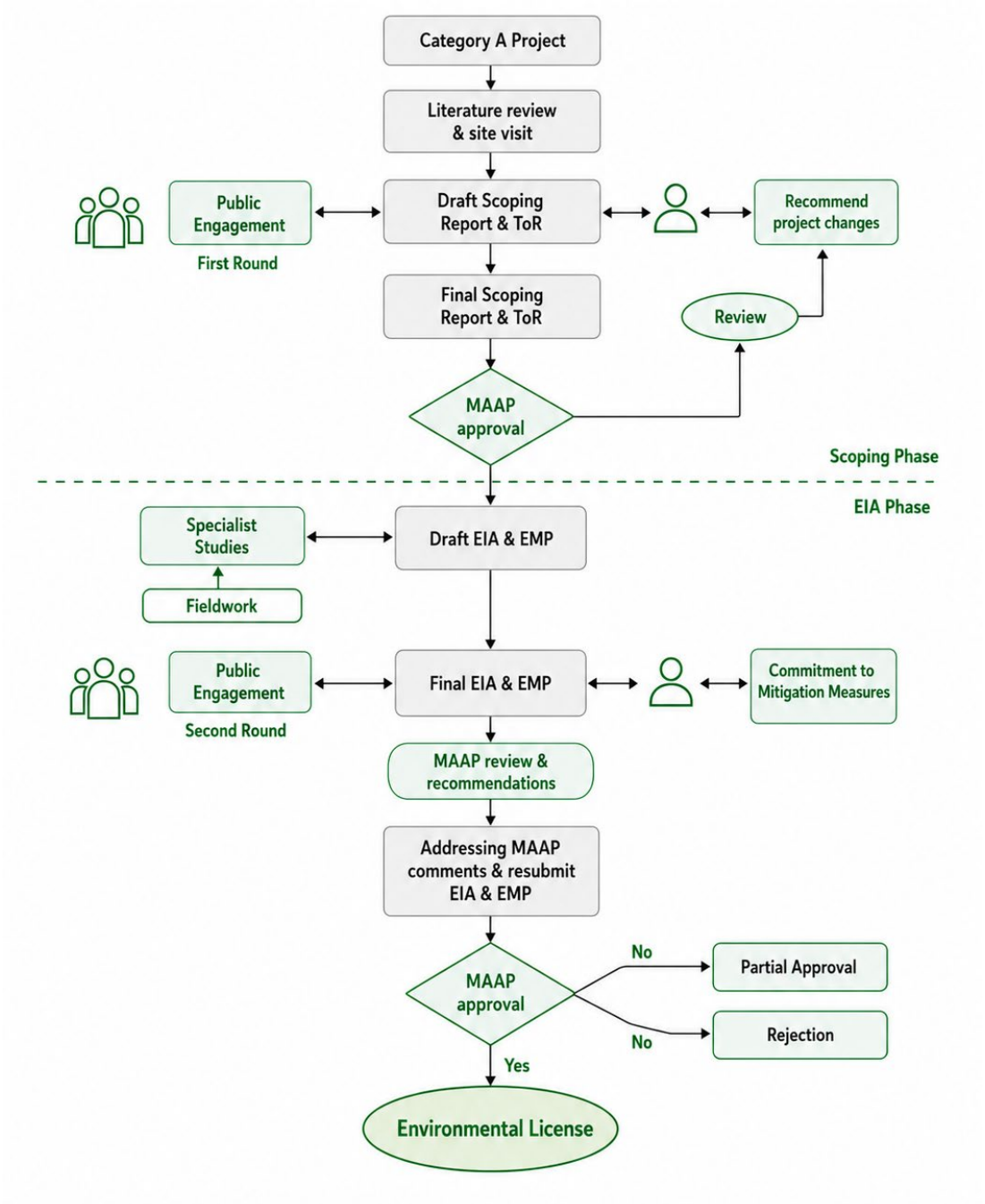


Figure 3-1: Methodological Sequence of the EIA Process

A Table 3-1 presents a summary of the main phases of the Environmental Impact Assessment process applicable to the Project, indicating, for each stage, the respective objectives, main activities, and expected outputs. This systematisation allows for an understanding of the logical sequence of the process, the articulation between the different moments of technical analysis and public participation, as well as the role of the Environmental Authority in reviewing and approving the submitted documents.

Table 3-1: Summary of the main phases of the EIA, respective purposes, expected outputs, and public participation mechanisms

Phase	Main purpose	Output / result	Public participation
Process Instruction and pre-assessment	To present the proposed activity and the preliminary environmental information necessary for the Environmental Authority's analysis.	Environmental categorisation and definition of the required assessment level.	Not the main public consultation phase, although it may involve preliminary institutional contacts.
EPDA	To identify critical issues, potential fatal flaws, preliminary influence areas, and matters to be deepened in the EIA.	EPDA report, public participation report, and EIA ToR presented in a dedicated section.	First formal round of public participation, collecting comments on the project, the EPDA, and the proposed scope for the EIA.
EIA	To deepen the technical assessment, carry out specialist studies, assess impacts, and define mitigation and management measures.	EIA report, PGA, and public participation report for the EIA phase.	Second formal round of public participation, focusing on the assessment results and proposed measures.
Review, decision, and licensing	To allow for the technical and institutional appraisal of the EIA and PGA by the Environmental Authority and relevant sectors.	Approval, conditional approval, request for complementary information, or rejection; eventual issuance of the Environmental Licence.	Comments and commitments made are consolidated in the final reports and reflected in the PGA, where applicable.

3.5 Process Instruction Phase – Screening Report

The Process Instruction constitutes the first formal step of the EIA process. In this phase, the proponent submits preliminary information about the Project to the Environmental Authority, including its location, justification, main activities, legal framework, known biophysical and socioeconomic characteristics of the preliminary influence area, and the Preliminary Environmental Information Form.

The purpose of this phase is to allow the Environmental Authority to carry out a preliminary assessment of the Project and define the applicable environmental category. For Category A activities, the categorisation decision confirms the need for a full EIA process, including EPDA, TOR, EIA, PGA, and public participation. In the case of projects located in more than one province or with extensive offshore incidence, the process is normally conducted at the central level, with coordination with the competent provincial services.

The information presented at this stage is preliminary in nature. Its objective is not to exhaustively assess the impacts, but rather to provide sufficient elements for the classification of the Project and for the definition of subsequent stages of the process. Gaps identified in the available information are recorded to be addressed during the EPDA phase and, when necessary, deepened in the EIA.

3.6 Scoping Phase - Environmental Pre-feasibility and Scope Definition Study

The EPDA phase's main function is to establish the scope of the environmental assessment to be developed in the EIA phase. For this purpose, available data on the Project and the receiving environment are reviewed, preliminary areas of influence are identified, relevant environmental and social sensitivities are analysed, and issues that may condition the environmental feasibility of the Project or require specialised assessment are identified.

In the context of offshore seismic acquisition, the EPDA phase must consider the location of the acquisition areas, the distance to the coast, proximity to conservation areas or ecologically sensitive areas, the potential presence of sensitive marine species, known fishing and navigation patterns, and the existence of other current or planned uses of the maritime space. This analysis allows for the differentiation of aspects that can be adequately characterised based on secondary information from those that require specific studies in the EIA phase.

The EPDA Report identifies potential environmental and social impacts preliminarily. This identification does not constitute the final assessment of the impacts, nor does it replace specialist studies. Its purpose is to guide the next phase, ensuring that the EIA focuses on the relevant issues for the environmental decision. Similarly, the analysis of potential fatal flaws is carried out based on available information and seeks to determine if there are environmental or social risks or incompatibilities that could compromise the Project's feasibility, before carrying out the detailed assessment.

The TOR for the EIA are developed as a product of the EPDA phase and presented in a dedicated chapter of the EPDA Report.

3.6.1 Public Participation in the EPDA Phase

The EPDA phase includes a first formal round of public participation, conducted in accordance with the General Directive for Public Participation in the EIA Process. This round aims to inform Stakeholders and Affected Parties about the Project, gather concerns, identify potentially affected uses of maritime space, and obtain input on matters that should be further explored in the EIA.

For an offshore project, public participation is particularly relevant in identifying economic and social activities that may temporarily interact with the seismic campaign. These include artisanal fishing, industrial fishing, navigation, maritime tourism activities, maritime and fishing authorities, provincial and coastal district administrations, civil society organisations, and entities responsible for conservation, cultural heritage, and maritime spatial planning.

Comments received during the EPDA phase are recorded, analysed, and responded to in the Public Participation Report. When pertinent, they are incorporated into the final version of the EPDA and considered in the definition of the TOR for the EIA.

3.7 Environmental Impact Assessment Phase – Environmental Impact Study

The EIA phase begins after the approval of the EPDA and the ToRs by the Environmental Authority. This phase corresponds to the detailed technical assessment of the impacts of the Project, based on the specialist studies defined within the approved scope, the Project's technical information, and the contributions gathered during public participation.

The EIA deepens the characterisation of the baseline situation and assesses the foreseeable effects of the mobilisation, operation, and demobilisation activities. The assessment distinguishes impacts direct, indirect,

cumulative and, where applicable, transboundary; it considers impacts that are temporary and reversible; and integrates plausible accidental scenarios, compatible with the offshore nature of the Project. The assessment must also identify existing technical uncertainties and indicate the management or monitoring measures necessary to reduce these uncertainties during implementation.

The specialist studies provide the technical basis for the assessment. For offshore seismic acquisition projects, the most relevant studies typically include marine ecology and biodiversity, fisheries, socioeconomics, navigation and maritime safety, underwater cultural heritage, and underwater noise assessment (see chapter 7).

Based on the assessment of impacts, the EIA defines prevention, minimisation, control, monitoring, and, where applicable, compensation measures. These measures are consolidated in the Environmental Management Plan, which constitutes the operational instrument for ensuring the implementation of environmental and social commitments during the Project activities.

3.7.1 Environmental Management Plan

The Environmental Management Plan (EMP) constitutes an essential component of the EIA Report, as it translates the results of the impact assessment into concrete environmental management, mitigation, monitoring, and control measures. The EMP should not be understood as a document separate from the environmental assessment, but rather as the operational expression of the commitments made in the EIA to prevent, reduce, or manage the identified impacts.

The EMP therefore establishes the environmental management framework approved under the licensing process, including mitigation objectives, measures to be applied, monitoring indicators, general responsibilities, verification frequency, reporting requirements, and corrective mechanisms in case of non-compliance. Its function is to ensure that the EIA conclusions do not remain merely as technical recommendations, but are converted into practical obligations to be observed during the Project execution.

In the case of the 3D Marine Seismic Acquisition Project, this relationship is particularly important to ensure that potential impacts on marine biodiversity, fisheries, navigation, maritime safety, maritime space use, and coastal communities are managed coherently with the technical assessment carried out. For example, measures associated with underwater noise, the presence of marine mammals or sea turtles, communication with the fishing sector, collision prevention, and waste or hydrocarbon management should reflect the impacts assessed in the EIA and the sensitive receptors identified in the specialist studies.

3.7.2 Public Participation in the EIA phase

The EIA phase includes a second formal round of public participation. In this phase, the Draft EIA Report and the EMP are disclosed, allowing Stakeholders and Affected Parties to analyse the assessment results, the proposed mitigation measures, and the environmental and social management commitments.

The public consultation of the EIA Phase allows to verify whether the concerns raised in the EPDA phase have been adequately addressed, to collect additional comments on the impact assessment and to adjust, where justifiable, the proposed management measures. The final public participation report documents the activities carried out, the comments received, the responses provided, and how the contributions were considered in the EIA and the PGA.

3.8 Submission of the EIA to MAAP

Following the completion of the EIA phase Public Participation Process, the Preliminary EIA Report and its respective Environmental Management Plan (EMP) are reviewed and updated, where applicable, to integrate the opinions, comments, concerns, and recommendations presented by Interested and Affected

Parties (IAPs), as well as the clarifications provided by the technical team. This review ensures that the Final EIA Report reflects not only the results of the specialist studies and the technical assessment of impacts, but also the relevant contributions received during the public consultation process.

Once this consolidation is complete, the Final EIA Report, accompanied by the EMP, the Public Participation Process Report, and the applicable specialist studies, is submitted to the Ministry of Agriculture, Environment and Fisheries (MAAP), as the competent Environmental Authority, for appraisal, technical review, and decision. In accordance with the Regulation on the Environmental Impact Assessment Process, for Category A activities, the EIA Report must be submitted within a maximum of 360 days after the approval of the EPDA and Terms of Reference by the Environmental Authority.

Following submission, the EIA is appraised by the Technical Assessment Commission (TAC), established within the framework of the EIA process. The TAC conducts a technical review of the report, assessing the study's compliance with the approved Terms of Reference, the sufficiency of the information presented, the robustness of the assessment of impacts, the adequacy of the proposed mitigation measures, and the consistency of the EMP. The Technical Assessment Commission must also consider written or oral submissions made within the scope of public participation, provided they relate to the environmental and social impacts of the activity.

For Category A projects, the Environmental Authority must communicate its decision on the EIA within a maximum of 45 working days from the date of registration of complete documentation. This period may be suspended if the Environmental Authority requests complementary information, technical clarifications, or adjustments to the EIA and/or EMP, with the count resuming after the Proponent submits the requested information. When an addendum or complementary information is requested, it must be submitted by the Proponent within the applicable period defined by the Environmental Authority, respecting the current regulatory framework.

The Environmental Authority's decision may result in the approval of the EIA and the consequent issuance of the Environmental Licence, conditional approval subject to the implementation of additional measures or compliance with specific requirements, or rejection of the activity, if it is concluded that the impacts are unacceptable or cannot be adequately prevented, mitigated, or managed. In case of approval, all activities associated with the Project will be bound to comply with the approved EMP, as well as the specific conditions, recommendations, and obligations that may be established in the Environmental Licence.

The issuance of the Environmental Licence does not, therefore, represent the closure of the Project's environmental management, but rather the transition to the implementation and control phase. From that moment on, the Proponent must ensure that the EMP is adopted as a binding environmental management instrument, integrating it into the Project's internal procedures and the contractual obligations of contractors and subcontractors.

3.9 Environmental Management System in the Seismic Acquisition

Following the obtaining of the Environmental Licence, the Proponent shall develop and implement an Environmental and Social Management System appropriate for the Project execution phase. This system shall integrate, operationalise and complement the Environmental Management Plan (EMP) approved within the scope of the EIA, as well as all recommendations, conditions, and obligations that may be established by the Environmental Authority in the licensing act.

It is important to clarify that the EMP prepared within the scope of the EIA constitutes the Project's main environmental commitment instrument, defining the mitigation measures, monitoring, general responsibilities, reporting requirements, and management principles to be observed during the mobilisation, operation, and demobilisation phases. However, this EMP does not replace the detailed

operational procedures that can only be defined by the Proponent, their contractors, and the operation team at a later stage, when all relevant technical and logistical elements have been confirmed.

The role of the EIA and its respective EMP is to establish the minimum environmental and social requirements, the binding commitments, the performance objectives, and the management measures that must be respected. The role of the Environmental and Social Management System, to be developed after the licence and before the commencement of activities, is to transform these requirements into concrete, verifiable, and applicable operational procedures on land and at sea.

Thus, the Environmental and Social Management System shall include, among other elements, specific procedures for the implementation of the EMP measures, the detailed distribution of responsibilities among the Proponent, contractors, and subcontractors, communication and reporting plans, emergency procedures, registration forms, internal audit mechanisms, team training requirements, complaint management mechanisms, and environmental and social monitoring procedures. It shall also demonstrate how each condition of the Environmental Licence has been incorporated into the Project's management system.

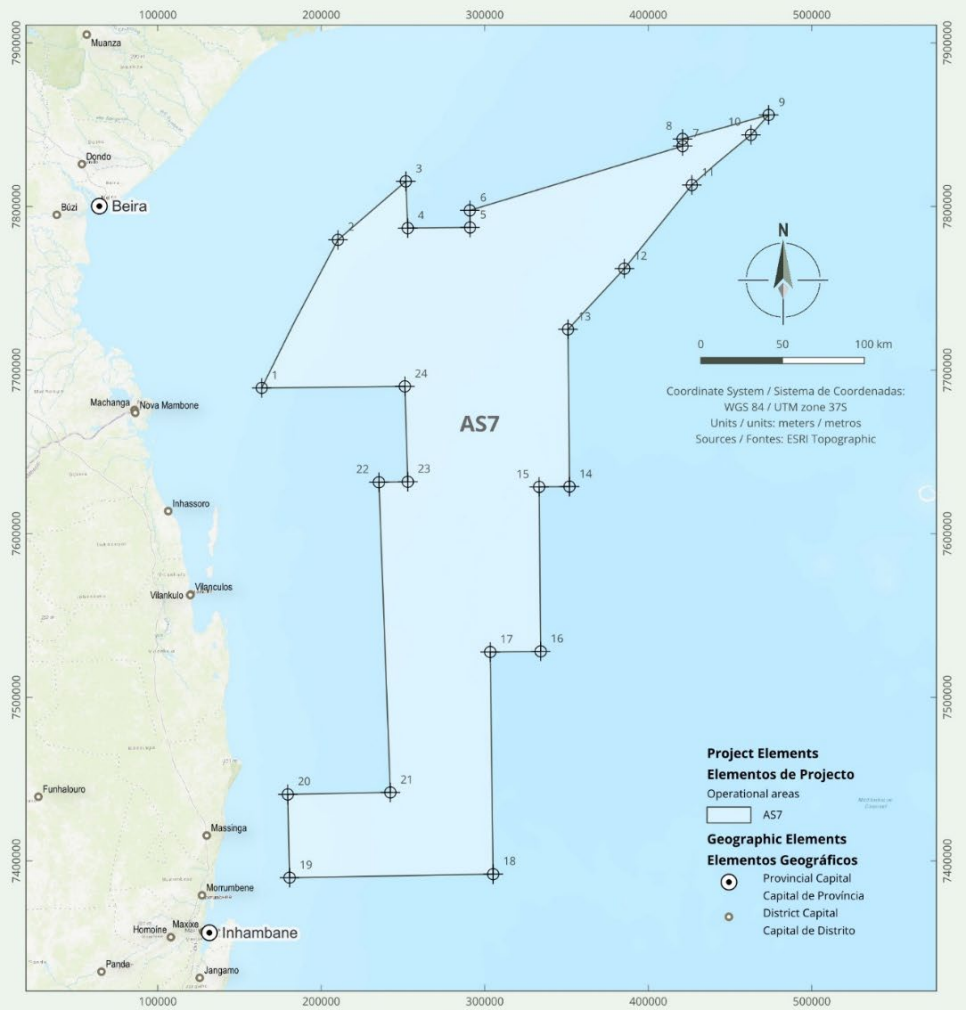
This approach does not reduce the EIA's requirement nor diminish the Proponent's responsibility. On the contrary, it ensures that environmental management is treated progressively and appropriately according to the level of information available at each phase. The Environmental Authority must be able to assess, in the EIA, whether the impacts have been duly identified, assessed, and mitigated, and whether clear management commitments exist. The Proponent, in turn, must ensure that these commitments are subsequently translated into operational instructions, responsibilities, and control mechanisms compatible with the actual execution of the campaign.

Therefore, the EMP approved within the scope of the EIA and the Environmental and Social Management System for the implementation phase should be understood as complementary instruments. The former establishes the framework of the Project's environmental and social obligations; the latter ensures its practical, updated, and verifiable application during mobilisation, operation, and demobilisation. This distinction is essential to avoid unrealistic expectations about the EIA's content, while simultaneously maintaining the robustness, traceability, and effectiveness of the Project's environmental management.

4 PROJECT DESCRIPTION

4.1 Location of the Project

Areas AS8 and AS7 are located in the central-south offshore region of Mozambique, off the coast of the Sofala and Inhambane provinces - see Figure 4-1 e Figure 4-2. These areas are located entirely in a marine environment, away from the coastline, on the continental shelf and adjacent sectors of the slope. The polygons for areas AS8 and AS7 were defined within the bidding process organised by INP, with their location based on official geographic coordinates (referenced in the WGS 84 / UTM Zone 37S system). These areas are part of the Mozambique Sedimentary Basin, recognised for its oil potential and history of geological exploration.



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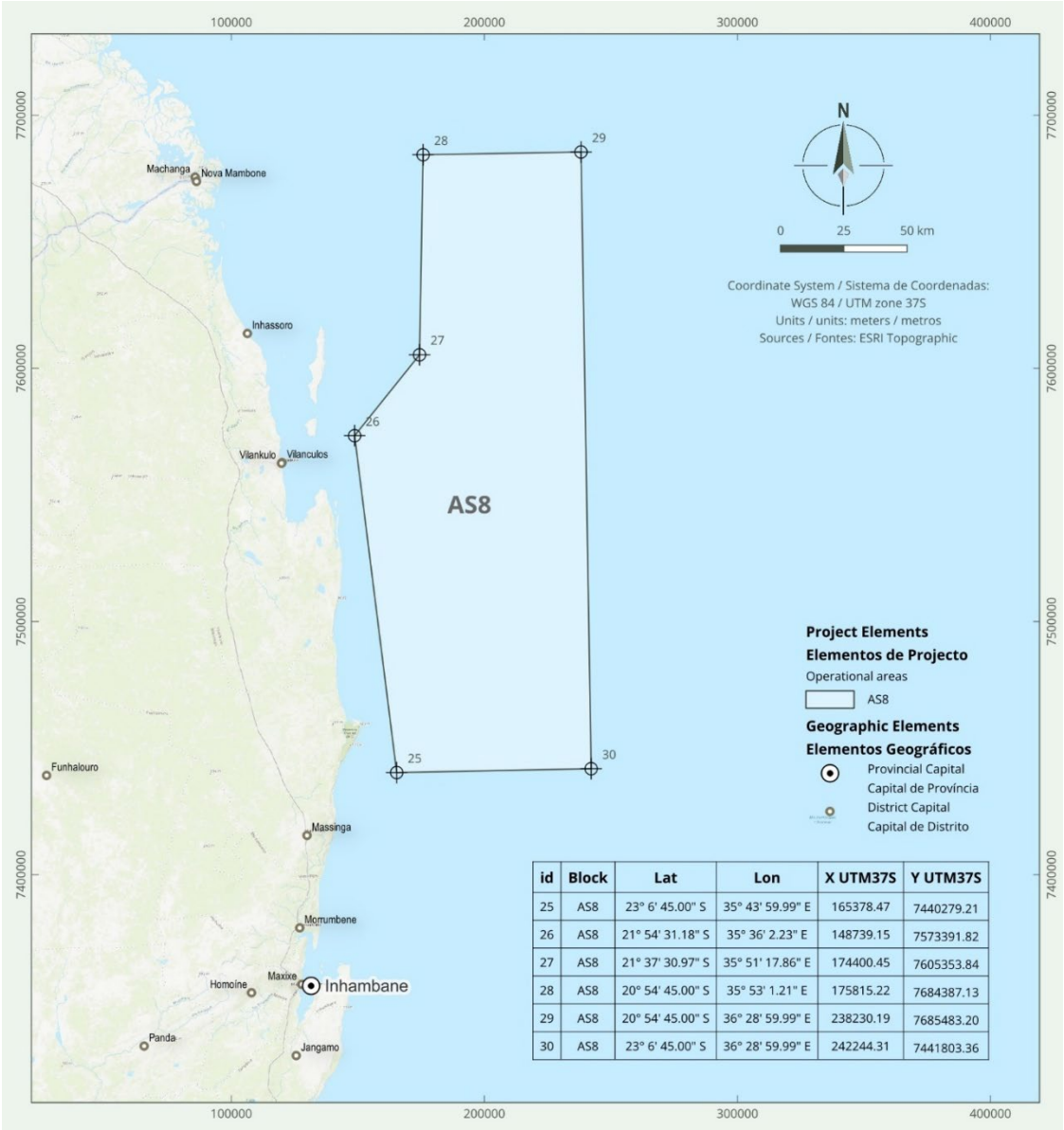
1	20° 52' 4.12" S	35° 46' 0.91" E	163560.73	7689098.31
2	20° 3' 31.50" S	36° 13' 45.01" E	210177.40	7779612.48
3	19° 44' 29.65" S	36° 37' 49.91" E	251684.07	7815381.11
4	19° 59' 59.03" S	36° 38' 17.45" E	252886.88	7786805.94
5	20° 0' 2.81" S	37° 0' 6.77" E	290954.56	7787185.29
6	19° 54' 23.18" S	37° 0' 6.77" E	290830.20	7797629.81
7	19° 33' 39.09" S	38° 14' 48.19" E	420985.01	7836938.89
8	19° 31' 17.40" S	38° 14' 48.19" E	420965.85	7841294.54
9	19° 23' 24.00" S	38° 44' 55.39" E	473615.00	7855999.91
10	19° 29' 59.20" S	38° 38' 42.50" E	462763.78	7843833.11
11	19° 46' 34.35" S	38° 17' 58.81" E	426637.45	7813131.35
12	20° 14' 8.70" S	37° 54' 9.94" E	385389.45	7762050.68

id	Lat	Lon	X UTM37S	Y UTM37S
13	20° 34' 8.61" S	37° 34' 9.80" E	350884.10	7724890.35
14	21° 26' 14.96" S	37° 34' 11.46" E	351792.29	7628756.79
15	21° 26' 15.00" S	37° 23' 27.60" E	333254.51	7628575.94
16	22° 20' 44.23" S	37° 23' 23.35" E	334185.99	7528030.99
17	22° 20' 44.52" S	37° 5' 24.25" E	303310.74	7527661.41
18	23° 34' 20.35" S	37° 5' 25.44" E	305111.35	7391823.19
19	23° 34' 18.19" S	35° 52' 16.32" E	180613.39	7389699.04
20	23° 6' 45.00" S	35° 52' 16.32" E	179511.18	7440589.16
21	23° 6' 45.00" S	36° 28' 59.99" E	242244.31	7441803.36
22	21° 24' 0.47" S	36° 26' 46.82" E	235250.15	7631414.09
23	21° 24' 0.00" S	36° 37' 0.01" E	252916.63	7631706.39
24	20° 52' 22.80" S	36° 36' 26.78" E	251080.01	7690055.20

Figure 4-1: Coordinates geographic of Area AS7



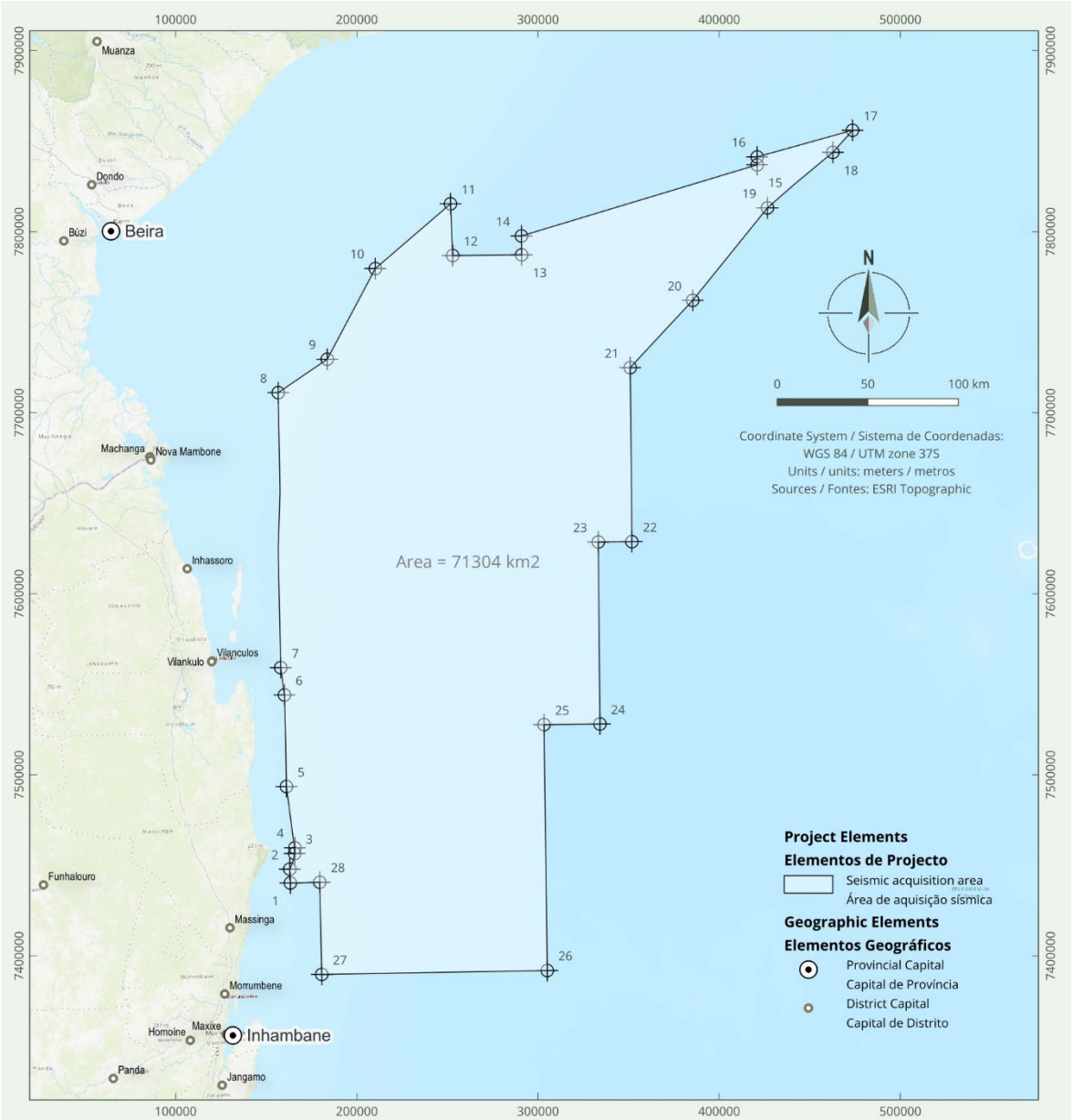
id	Block	Lat	Lon	X UTM37S	Y UTM37S
25	AS8	23° 6' 45.00" S	35° 43' 59.99" E	165378.47	7440279.21
26	AS8	21° 54' 31.18" S	35° 36' 2.23" E	148739.15	7573391.82
27	AS8	21° 37' 30.97" S	35° 51' 17.86" E	174400.45	7605353.84
28	AS8	20° 54' 45.00" S	35° 53' 1.21" E	175815.22	7684387.13
29	AS8	20° 54' 45.00" S	36° 28' 59.99" E	238230.19	7685483.20
30	AS8	23° 6' 45.00" S	36° 28' 59.99" E	242244.31	7441803.36

Figure 4-2: Coordinates geographic of Area AS8

According to the official announcement of the results of the 3rd tender for the acquisition of geophysical data, the company SLB was awarded areas AS7 and AS8 for the acquisition of 3D seismic data.

To ensure the adequate acquisition of 3D seismic data across the full extent of areas AS7 and AS8, SLB defined a single seismic acquisition area, resulting from a technical and environmental optimisation process, with the objective of increasing operational viability and avoiding impacts on sensitive coastal areas, as illustrated in the Figure 4-3 e Figure 4-4.

The delimitation of this optimised seismic acquisition area allowed, in particular, the reduction of the area to be surveyed in Area AS8, in the vicinity of the coastal zone (see Figure 4-4), in application of an environmental safeguard criterion. This criterion consisted of establishing an exclusion zone of approximately 15 km in relation to environmentally sensitive areas, including protected areas and critical habitats. This approach is aligned with international best practices, namely with the Performance Standards of the *International Finance Corporation* (IFC) and the guidelines of the *Joint Nature Conservation Committee* (JNCC), contributing to the minimisation of risks of disturbance to sensitive species and ecosystems, as well as to the reduction of potential conflicts with existing uses of the marine space.



id	Lat	Lon	X UTM37S	Y UTM37S
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2	23° 2' 38" S	35° 42' 41" E	162970.18	7447842.87
3	22° 57' 59" S	35° 44' 22" E	165635.11	7456476.65
4	22° 56' 17" S	35° 44' 29" E	165780.06	7459624.11
5	22° 37' 55" S	35° 42' 12" E	161113.52	7493461.38
6	22° 10' 31" S	35° 42' 13" E	160035.03	7544070.92
7	22° 2' 20" S	35° 41' 13" E	157965.77	7559146.03
8	20° 40' 6" S	35° 42' 15" E	156569.09	7711065.72
9	20° 30' 23" S	35° 58' 1" E	183645.06	7729535.92
10	20° 3' 31" S	36° 13' 45" E	210177.40	7779612.48
11	19° 44' 30" S	36° 37' 50" E	251684.07	7815381.11
12	19° 59' 59" S	36° 38' 17" E	252886.88	7786805.94
13	20° 0' 3" S	37° 0' 7" E	290954.56	7787185.29
14	19° 54' 23" S	37° 0' 7" E	290830.20	7797629.81

id	Lat	Lon	X UTM37S	Y UTM37S
15	19° 33' 39" S	38° 14' 48" E	420985.01	7836938.89
16	19° 31' 17" S	38° 14' 48" E	420965.85	7841294.54
17	19° 23' 24" S	38° 44' 55" E	473615.00	7855999.91
18	19° 29' 59" S	38° 38' 43" E	462763.78	7843833.11
19	19° 46' 34" S	38° 17' 59" E	426637.45	7813131.35
20	20° 14' 9" S	37° 54' 10" E	385389.45	7762050.68
21	20° 34' 9" S	37° 34' 10" E	350884.10	7724890.35
22	21° 26' 15" S	37° 34' 11" E	351792.29	7628756.79
23	21° 26' 15" S	37° 23' 28" E	333254.51	7628575.94
24	22° 20' 44" S	37° 23' 23" E	334185.99	7528030.99
25	22° 20' 45" S	37° 5' 24" E	303310.74	7527661.41
26	23° 34' 20" S	37° 5' 25" E	305111.35	7391823.19
27	23° 34' 18" S	35° 52' 16" E	180613.39	7389699.04
28	23° 6' 45" S	35° 52' 16" E	179511.18	7440589.16

Figure 4-3: Optimised seismic acquisition area

On the other hand, the single optimised seismic acquisition area includes zones located outside the AS8 and AS7 polygons defined by INP, namely through the inclusion of the separation zones between both areas, as well as a narrow additional strip of sea along the eastern boundary of both. This option has an essentially technical and operational justification, since, in seismic surveys, the spatial continuity of the data is a critical requirement to ensure the integrity and interpretability of the geophysical results. The existence of discontinuities between acquisition areas can compromise:

- the coherence of seismic profiles;
- the correct imaging of geological structures;
- the calibration and correlation between adjacent seismic lines; and
- consequently, the reliability of the final interpretation.

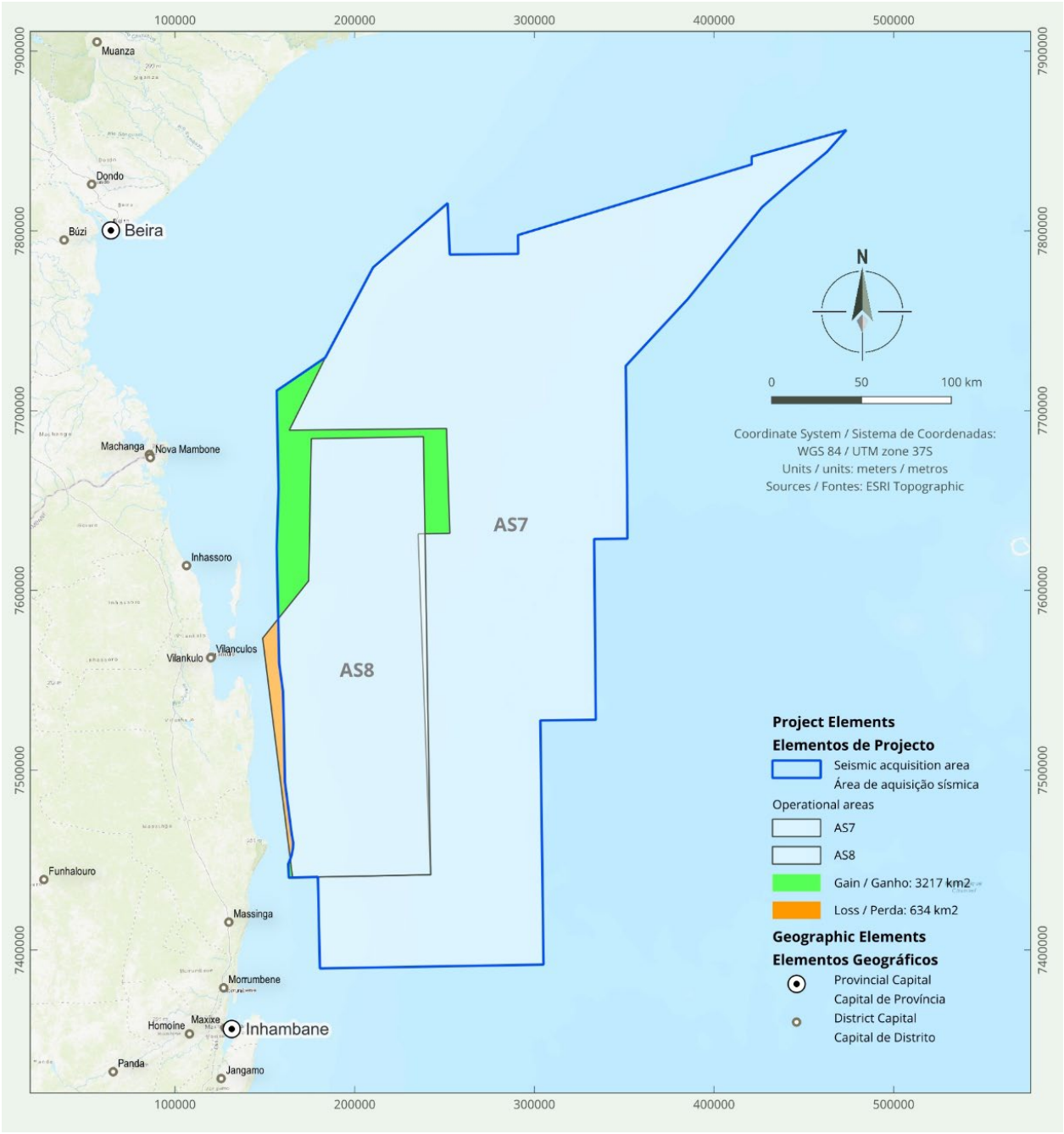


Figure 4-4: Seismic acquisition area optimised: consolidation and spatial adjustments

Thus, the lateral expansion was designed to ensure continuous and homogeneous coverage of the study area, eliminating discontinuities between previously defined blocks. This continuity is particularly relevant in geological contexts where structures may extend across administrative or operational boundaries initially defined.

Furthermore, the integrated configuration allows for greater operational efficiency, reducing the need for additional mobilisations, frequent equipment repositioning, and interruptions during acquisition. This results in a reduction of total operational time at sea, which, paradoxically, also contributes to an overall reduction in environmental exposure to seismic activities.

4.2 Justification for the Project

The justification for the Project stems directly from Mozambique's national strategy for the development and valorisation of hydrocarbon resources. INP based the launch of the tender on the "need to extend the assessment of the national territory's petroleum potential and geophysical data coverage", highlighting an existing gap in the geoscientific database of the national sedimentary basins.

In this context, the acquisition of 3D seismic data aims to:

- Improve the geological and structural knowledge of the seabed;
- Reduce uncertainties associated with the characterisation of petroleum systems;
- Support future decisions on licensing and development of petroleum blocks;
- Promote investment in the energy sector by making high-quality geophysical data available.

The location of the selected areas reflects geological prospectivity criteria, as they are situated within the Mozambique Basin, where active petroleum systems and potential for hydrocarbon accumulations have already been identified. Therefore, the choice of these areas is not based on arbitrary or logistical factors, but on a technical strategy aimed at maximising the value of the geophysical information to be acquired.

Additionally, the Project aligns with the international multi-client seismic data acquisition model, where specialised companies conduct geophysical surveys at their own expense and risk, subsequently making the data available to the market. This model helps accelerate the generation of geological knowledge without requiring direct State investment.

The selection of SLB as the awarded proponent reinforces the Project's technical viability, given its international standing as a provider of integrated technology and services in the energy sector, including advanced capabilities in seismic data acquisition, processing, and interpretation.

The Project is justified as a strategic intervention of public and economic interest, aimed at strengthening the national geoscientific knowledge base, promoting offshore petroleum potential, and supporting future decisions within the scope of Mozambique's natural resource management.

4.3 Petroleum and Gas Operations Life Cycle

The life cycle of petroleum and gas operations comprises a set of sequential and interdependent phases, extending from initial exploration to production and eventual decommissioning of infrastructure. (Figure 4-5). Generally, this cycle can be structured into four main phases: (i) exploration, (ii) appraisal, (iii) development, and (iv) production.

- A **exploration phase** constitutes the first stage of the cycle and its main objective is to determine the existence of petroleum systems and identify areas with potential for hydrocarbon accumulation. This phase includes activities such as geophysical data acquisition (namely 2D and 3D seismic), regional geological studies, sedimentary basin modelling, and, in some cases, initial exploratory

drilling. It is a phase characterised by a high degree of uncertainty and risk, where investments are directed towards acquiring geoscientific knowledge.

- A **appraisal phase** follows the identification of potential discoveries and aims to determine the size, geometry, and economic viability of the identified resources. In this stage, additional higher-resolution seismic campaigns, appraisal well drilling, and production tests are often carried out, as well as detailed technical and economic analyses. The central objective is to reduce reservoir uncertainty and support decision-making regarding the eventual development of the field.
- A **development phase** corresponds to the preparation for commercial exploitation of the resource. It includes defining the development concept, selecting technologies, drilling production wells, installing platforms and associated infrastructure (pipelines, processing units), as well as implementing operational, environmental, and safety management systems.
- Finally, **the production phase** involves the actual extraction of oil and/or gas, its processing, transportation, refining (where applicable), and commercialisation. This phase can extend for several decades, depending on the reservoir characteristics and the chosen exploitation strategy.

In the context of the present Project, it is important to highlight that the proposed activities fall exclusively within the exploration phase, corresponding to the acquisition of offshore seismic data. This section presents a description of the proposed seismic survey operations and the activities associated with the Project. The description is not intended to be exhaustive, but aims to provide a detailed understanding of the planned activities and identify those that may cause significant environmental impacts.

It is important to note that, for technical, economic, environmental, or strategic reasons, carrying out seismic survey activities does not necessarily imply the continuation of the oil development cycle. Indeed, even after the acquisition and interpretation of seismic data, the Government or concessionary entities may decide not to proceed to subsequent phases, namely exploratory drilling or development, should the results not demonstrate sufficient viability.

Figure 4-5: Cycle of hydrocarbon exploration

During the exploration phase, geoscientists analyse a comprehensive set of technical data, including:

- Structural and stratigraphic seismic interpretation;
- Geological modelling and the basin sedimentary;
- Integration with existing regional data;
- Preliminary petroleum systems evaluation (source rock, reservoir, seal, and trap).

These elements are subsequently integrated into conceptual models that support strategic decision-making, the fundamental outcome of which is to determine whether conditions exist to proceed to more advanced phases of the cycle, namely exploratory drilling ("drill or not to drill").

The Project under consideration corresponds to a non-intrusive intervention at the subsurface level (without drilling), focused on acquiring geophysical information, falling within an initial phase of the oil sector lifecycle, characterised by high uncertainty and with essentially exploratory and risk-reduction objectives for potential future investors.

4.4 Seismic Method

The 3D seismic method is a high-resolution geophysical technique used for characterising the subsurface structure and stratigraphy, with predominant application in hydrocarbon prospecting. It is based on the controlled generation of acoustic waves in the marine environment and the analysis of signals reflected by different geological layers, allowing the construction of detailed three-dimensional models.

4.4.1 Operating Principle

The seismic reflection method is based on the propagation of mechanical waves (P-waves, predominantly compressional) in elastic media, such as seawater and geological formations. These waves are generated by a towed acoustic source (airgun) that emits short-duration pressure pulses into the water column; these waves propagate radially, cross the seabed-water interface, penetrate the underlying rock layers, and are partially reflected at geological interfaces (reflectors) where contrasts in physical properties occur, presenting different velocities (Vp) and pressures (P) per layer. The reflected signals are recorded by hydrophones distributed along the cables (streamers), allowing the reconstruction of the subsurface structure. (Figure 4-6).

When seismic waves encounter boundaries between different materials (with different densities, for example), part of the energy continues to advance to the underlying layers and part is reflected, returning to the surface as echoes, at different times. The characteristics of these echoes, particularly their intensity and shape, depend on the acoustic impedance contrast between the layers, allowing interpretation of the continuity, thickness, and geometry of geological formations.

The reflected signals return to the water column and are detected by hydrophones distributed along the seismic cables (streamers) towed at the operating depth (near the surface). Each receiver continuously records the pressure variation over time, with the information being stored in digital format and associated with the precise position of the source and receivers at the moment of each shot.

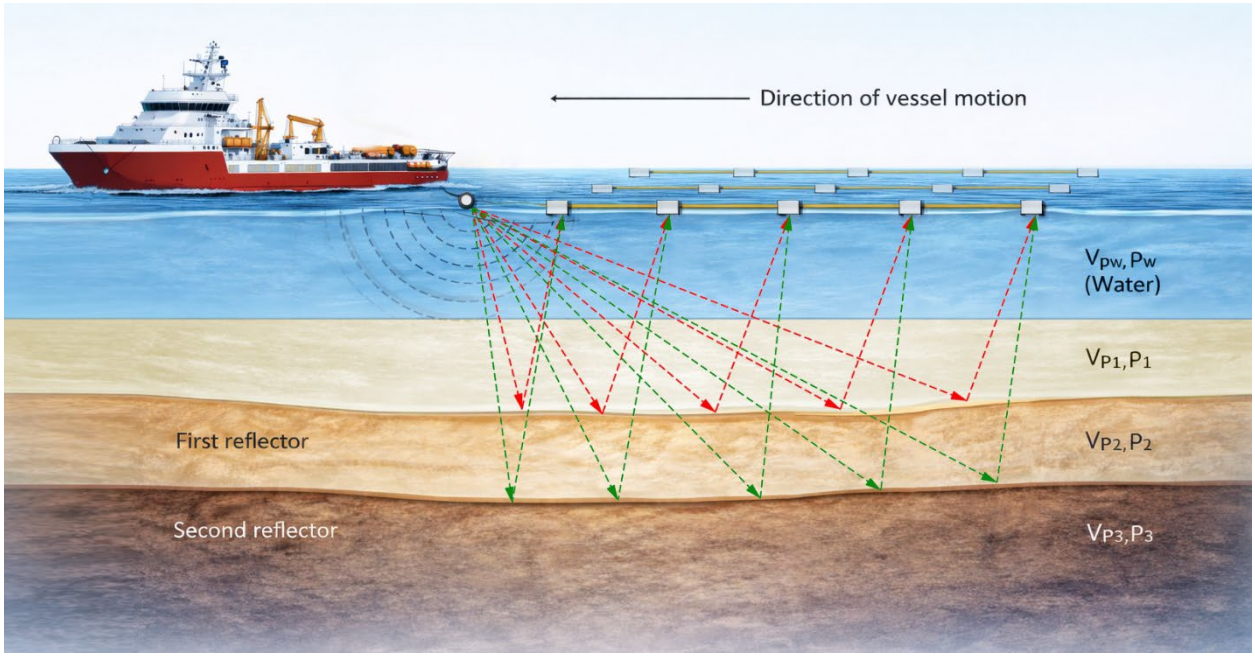


Figure 4-6: Conceptual diagram of marine seismic acquisition

During the processing phase, carried out in an onboard computational laboratory, the recorded data are initially corrected for acquisition geometry (source and receiver positions) and subjected to filtering procedures to reduce noise and interference. Subsequently, stacking is applied, which consists of combining multiple records from the same subsurface point to enhance the useful signal. Finally, migration is used, a technique that correctly repositions reflectors in space, converting the two-way travel times of the waves into seismic images that represent, with greater accuracy, the location and geometry of interfaces at depth. (Figure 4-7).

Through additional seismic inversion procedures and calibration with well data (when available), these images can be transformed into quantitative models of rock and fluid properties, supporting the identification and preliminary evaluation of potential hydrocarbon reservoirs.

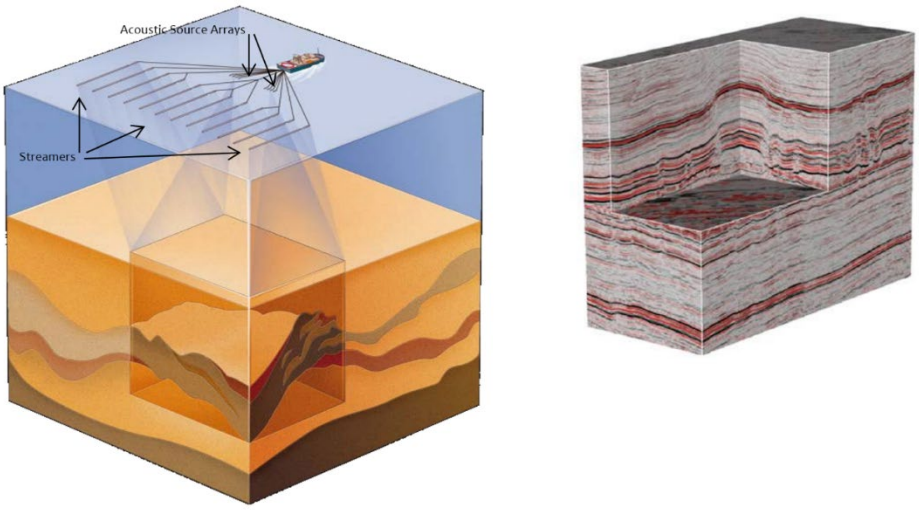


Figure 4-7: 3D seismic acquisition, allows multilateral analysis of geological structures

4.4.2 Operational Configuration

Offshore 3D seismic acquisition is carried out by a specialised seismic vessel, equipped with data generation and recording systems. The typical configuration includes:

- **Seismic source (airguns):** a set of chambers that release compressed air in a controlled manner, generating high-energy acoustic pulses. These sources are towed at a shallow depth (typically between 5 and 10 metres).
- **Seismic cables (streamers):** long cables (potentially several kilometres in length) containing hydrophones distributed along their length. They are towed parallel to the vessel, at controlled depths (generally between 5 and 15 metres).
- **Positioning system**: integration of differential GPS, acoustic sensors, and inertial systems that allow the precise determination of the source and receiver positions in three-dimensional space.
- **Control and acquisition system:** responsible for synchronising pulse emission, recording reflected signals, and storing raw data.

In a 3D acquisition, the vessel tows multiple parallel streamers (typically between 6 and 14 or more, depending on the system's capacity) (Figure 4-8), covering a wide swathe of the seabed. The vessel travels along parallel acquisition lines, with regular spacing, ensuring continuous spatial coverage of the study area.

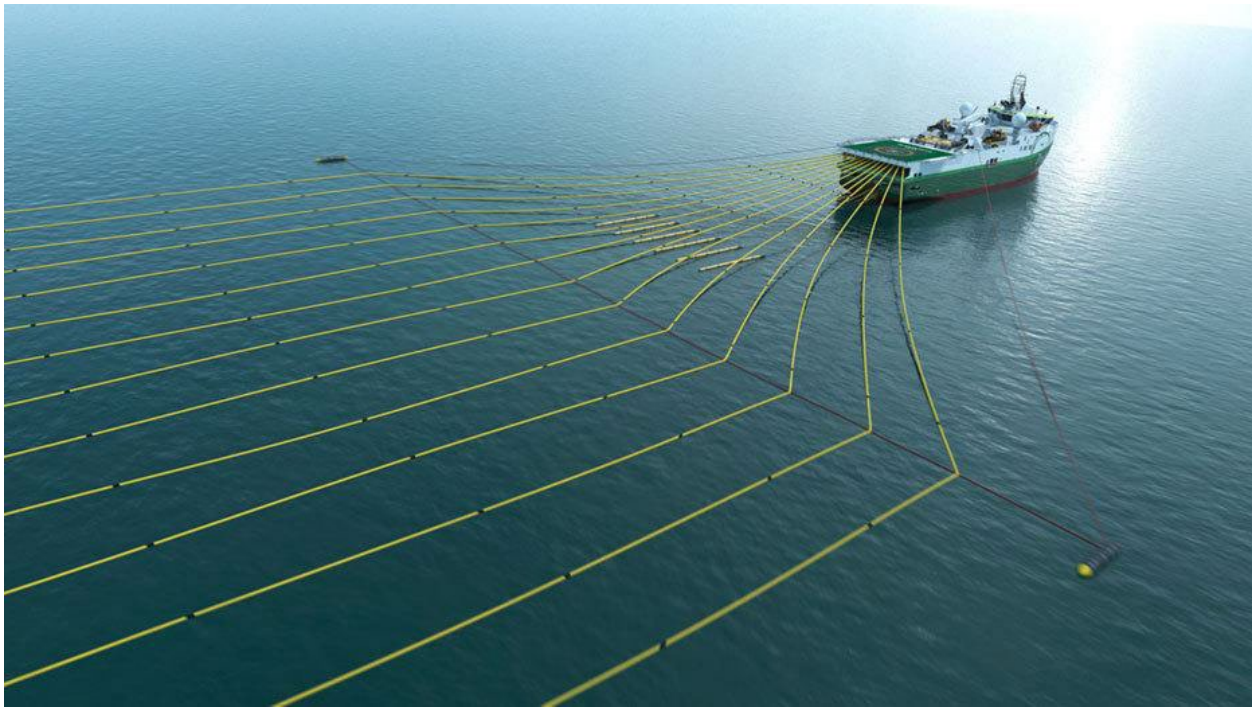


Figure 4-8: Seismic acquisition vessel towing multiple seismic cables (streamers)

4.5 Seismic Vessel

The seismic vessel is a specialised craft that integrates the necessary systems for offshore seismic data acquisition, including acoustic energy generation, data recording, and acquisition geometry control.

- Instrumentation room constitutes the operational control centre, where seismic data recording, control of towed cables and acoustic sources, as well as real-time monitoring of positioning and data quality are carried out.

- The aft deck is the main operational area, intended for the storage, deployment, and recovery of seismic cables (streamers) and source systems (airguns). It also includes the towing system and positioning devices, ensuring the correct alignment and spacing of equipment at sea.
- The compressor room supplies high-pressure compressed air to the seismic sources, enabling the continuous and controlled emission of acoustic pulses during acquisition.

These components function in an integrated manner, ensuring the efficient and controlled execution of offshore seismic operations.

The operations will be carried out by a seismic vessel, HAI YANG SHI YOU 721, or similar, approximately 107.4 m in length, 24 m in beam, and a gross tonnage of around 13,075 tonnes, equipped with diesel-electric propulsion, bow thruster, and 360° azimuth, an endurance of about 62 days, and accommodation for approximately 75 people.

The vessel is equipped with the ORCA navigation system, GNSS positioning, streamer acoustic tracking systems, and satellite communication means, which allow for precise control of the seismic "spread" geometry and ensure navigation safety.

Figure 4-9: HYSY721 - Deep-water seismic exploration vessel to be used or similar

From an operational perspective, the vessel moves at reduced speeds (planned at 4.2 knots – approximately 7.7 km/h) to ensure the stability of the acquisition system and data quality. The presence of long cables limits manoeuvrability, requiring the definition of safety zones and coordination with other maritime activities. Acquisition takes place continuously during defined periods, until full coverage of the area of interest is achieved.

4.6 3D Seismic Acquisition Geometry and Planning

3D seismic acquisition with towed cables is characterised by a high degree of prior planning, aimed at ensuring that the acquired data meets the defined geological and geophysical objectives. A the survey area is previously delimited based on existing information, often from 2D seismic campaigns, in this case corresponding to the area already resulting from INP studies (AS7 and AS8) and then an acquisition plan is designed that defines the orientation of the lines, the spatial limits, and the relevant operational parameters.

This planning includes the definition of critical variables, such as spatial sampling density, the interval between seismic sources, the distance between receivers, and the signal recording time (listening time). These parameters are adjusted according to the depth of the geological target, the expected structural complexity, and the desired resolution, being decisive for the final data quality.

Unlike 2D seismic, where lines are acquired in isolation and often oriented in specific directions to intercept dominant geological structures, 3D acquisition is based on the systematic coverage of an area through multiple parallel lines, with consistent orientation. In practice, this involves acquiring a dense set of seismic profiles, regularly spaced, which together allow for the reconstruction of a continuous subsurface volume.

The separation between acquisition lines (*sail line separation*) is typically between 400 and 800 metres, depending on the system configuration and the number of towed cables. However, due to the simultaneous use of multiple streamers, each navigation line allows for the acquisition of a much more densely spaced set of sub-surface seismic profiles, generally with intervals of around 25 to 50 metres. This geometry results in high data redundancy, essential for improving the quality of the seismic image and the lateral resolution of geological structures.

The need for wide manoeuvres arises from the physical characteristics of the acquisition system. The seismic vessel has significant dimensions (107 metres in length) and tows cables several kilometres long, which implies a large turning radius during changes of direction. This operational constraint is incorporated into the acquisition planning, influencing the geometry of the lines and the organisation of the work phases.

The seismic lines correspond to the pre-defined paths along which the acquisition vessel carries out geophysical survey profiles, ensuring systematic and continuous coverage of the study area. (Figure 4-10). In the case of 3D acquisitions, these lines are typically parallel to each other and regularly spaced, allowing for the acquisition of a data volume with adequate lateral coverage. At the end of each line, the vessel performs reversal manoeuvres (turns), generally in a semi-circular trajectory, in order to align with the next line, ensuring the continuity of the acquisition.

It is important, however, to note that, at the current stage of the Process Instruction, the specific layout of the seismic lines, their spacing, and the detailed acquisition geometry have not yet been defined, with these aspects being dependent on subsequent phases of technical planning for the operation. These elements may also be adjusted depending on operational and environmental constraints, and any mitigation measures to be defined within the scope of the EIA.

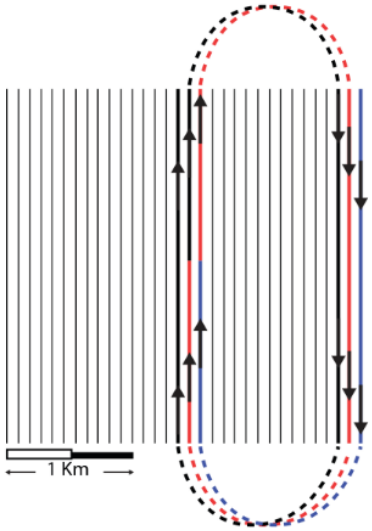


Figure 4-10: Illustrative diagram of parallel seismic lines and reversal manoeuvres (turns) between acquisition profiles, showing the typical operational sequence of a 3D seismic survey.

The way data is acquired has direct implications for operational efficiency and the final quality of the product. Factors such as weather conditions, sea currents, tides, the presence of fishing vessels, and other operational restrictions influence the execution of the survey and may require adjustments to the initial plan. For this reason, although standard methodologies exist, 3D seismic acquisition is always adapted to the specific conditions of each area.

It is also important to note that 3D seismic is currently the predominant methodology in the industry, accounting for over 90% of marine seismic data acquired globally, and is used not only in exploration phases but also in production contexts, including repeat surveys (4D seismic) for reservoir monitoring over time.

4.7 Operational Parameters for Seismic Acquisition

The operational parameters presented in the Table 4-1 correspond to a preliminary characterisation of the seismic acquisition activity, based on the information currently available and on reference technical assumptions for this type of operation. These parameters aim to support the initial process instruction and the preliminary assessment of potential environmental impacts.

It should be noted, however, that these may be adjusted in subsequent phases of the project, depending on the greater detail to be introduced in the operational design of the seismic campaign, as well as the potential need to incorporate mitigation measures that may be defined within the scope of the EIA. Such adjustments may include, in particular, the acoustic source configuration, acquisition parameters, operational planning, and environmental management procedures, and must be duly substantiated and validated by the competent authorities.

Table 4-1: Operational Parameters Reviewed (Preliminary)

Parameter	Value	Technical Description	Simplified Description
Type of seismic campaign	3D	Three-dimensional seismic acquisition with continuous lateral coverage.	Method that allows “seeing” the subsurface in three dimensions.
Average vessel speed	4.2 knots (~7.78 km/h)	Acquisition speed during equipment towing.	Slow and constant speed to ensure data quality.

Parameter	Value	Technical Description	Simplified Description
Number of support vessels	3 (2 guard + 1 supply)	Auxiliary vessels for safety and logistics.	Support boats that ensure safety and supply.
Turning radius	6500 m	Radius required for manoeuvres with streamers in operation.	Space required for the vessel to make turns without damaging the cables.
U-turn perimeter	20.4 km	Distance covered during the line reversal manoeuvre.	Total distance to turn around and start a new line.
Turning time	~3 hours	Estimated duration of the reversal manoeuvre.	Time needed to reposition the vessel.
Number of airguns	26 (up to 28 with reserve)	Number of acoustic sources in the seismic array.	Quantity of devices that generate the sound.
Total array volume	up to 3000 cu.in. (≈ 49.16 L)	Total volume of compressed air released per shot.	Defines the “power” of the sound produced.
Operating pressure	~2000 psi (~138 bar)	Operating pressure of the airguns.	Internal pressure that allows the acoustic impulse to be generated.
Source configuration	Up to 3 sub-arrays (sequential firing)	Source organisation into groups with alternating firing (flip, flop, flap).	Alternating firings to improve data quality and sound control.
Interval between firings (shot interval)	~7 seconds	Time between successive emissions of acoustic energy.	Regular interval between sound “firings”.
Spacing between firings	~16.667 m	Distance between consecutive acquisition points along the line.	Distance between each measurement along the path.
Dominant frequency	~20–60 Hz	Range of predominant frequencies of the seismic signal.	Low-frequency sounds used to penetrate the subsurface.
Operating depth of airguns	~8 m	Towing depth of the acoustic source.	Position of equipment below the sea surface.
Logistical support port	Port of Beira	Base for resupply, crew changes, and waste management.	Onshore location supporting offshore operations.
Port operations	Resupply, logistics, crew rotation, waste management	Support activities for offshore operations.	Everything necessary to keep the operation running.
Crew on board	~55 people	Number of people embarked on the seismic vessel.	Team operating the vessel and equipment.
Crew rotation	~6 weeks	Frequency of crew replacement.	Interval between team changes.
Environmental procedures	Compliance with JNCC guidelines	Mitigation measures for underwater noise (soft-start, fauna observation, shutdown).	Rules to protect marine animals during operation.

4.8 Offshore Seismic Acquisition Operations

4.8.1 Mobilisation and Operational Preparation

The initial phase of operations, designated as mobilisation, consists of the integral preparation of the seismic vessel with all necessary resources, including fuel, provisions, seismic equipment, and specialised crew. Before arrival at the study area, the seismic survey design is previously defined, including the acquisition line geometry, operational parameters, and shot point positioning.

The integrated navigation systems are loaded with this information, allowing the vessel to precisely follow the planned lines. During this phase, meteorological and oceanographic conditions are also monitored, ensuring operational viability.

4.8.2 Deployment and Equipment Configuration

As the acquisition area is approached, the deployment of towed equipment begins, namely the seismic streamers and depth control devices (birds). These systems are carefully calibrated to ensure neutral buoyancy and stability at the defined operational depth, considering variables such as water temperature and salinity.

The seismic sources (airgun arrays) are subsequently deployed and connected to the air compression system. In parallel, positioning systems are installed, including buoys and sensors, ensuring strict control of the system's geometry at sea.

Before acquisition begins, all equipment is tested, including background noise recordings and communication checks, ensuring system integrity.

4.8.3 Start of Acquisition and Seismic Line Execution

Data acquisition begins after the vessel is positioned on the survey line (run-in). The navigation system takes control of the trajectory, ensuring the vessel maintains the necessary direction, speed, and alignment.

The seismic sources are activated at regular intervals, generating acoustic pulses that propagate into the subsurface. This process is repeated along the entire length of the seismic line, while the sensors continuously record the reflected signals.

During acquisition, each team member performs specific functions:

- Monitoring of positioning and navigation;
- Control of mechanical systems and compressors;
- Verification of data quality and operational logging.

4.8.4 Environmental Monitoring and Start-up Conditions

Before the activation of the acoustic sources, an observation period is often implemented for the detection of marine mammals, typically lasting between 30 and 60 minutes. Passive acoustic systems will also be used to enhance monitoring.

Acquisition only commences after confirmation of the absence of sensitive species in the operational exclusion zone, in accordance with international best practices.

4.8.5 Line Completion and Operational Transition

At the end of each seismic line, acquisition is interrupted and the vessel enters line change mode. This process involves repositioning the vessel to the next line, taking approximately dthree (3) hours.

During this period, technical checks, preventive maintenance, and any necessary equipment adjustments are carried out, ensuring operational continuity.

4.9 Operational Constraints

4.9.1 Weather Conditions

Seismic operations are preferably carried out in calm sea conditions, in order to minimise background noise and ensure data quality. Adverse conditions may lead to the temporary suspension of operations or the retrieval of equipment, with crew safety being the priority factor.

4.9.2 Maritime Traffic

In areas with high maritime activity, operations are constrained by the limited manoeuvrability of the vessel, due to the long towed cables (which can reach several kilometres). To mitigate risks of interference or collision, support vessels may be used for traffic management.

4.9.3 Currents, Depth and Obstacles

The presence of strong currents, shallow waters, or offshore infrastructure can affect equipment stability and acquisition efficiency. These conditions are considered during the planning phase, although they may reduce operational performance in certain contexts.

4.9.4 Continuity of the Operational Cycle

The acquisition process is repeated sequentially along the various planned lines, forming a continuous cycle of positioning, acquisition, transition, and control. Potential technical failures, adverse environmental conditions, or external interferences may cause delays or interruptions, which are managed through operational procedures and real-time adjustments.

4.10 Operational Procedures

Proponent and the Consultant within the scope of the Process of EIA assume that the mitigation measures applicable to seismic surveys should be based on the best available scientific evidence, while being coherent with internationally recognised practices that are effective and operationally viable.

4.10.1 International Regulatory Framework

The regulatory framework applicable to the mitigation of impacts of seismic operations on marine mammals shows significant variations between jurisdictions, reflecting institutional differences, levels of ecological sensitivity, and the maturity of environmental management regimes. However, there is a growing convergence around a set of common technical principles, based on the best available scientific evidence and operational practices consolidated by the industry.

Generally, these regulatory frameworks are based on the definition of exclusion and monitoring zones, the implementation of soft-start and shutdown procedures, and the use of visual observation systems (Marine Mammal Observation - MMO) and acoustic systems (Passive Acoustic Monitoring - PAM). Additionally, they include requirements relating to observer qualifications, systematic data recording, and the adaptation of measures according to the specific characteristics of species and environmental contexts.

A Table 4-2presents a comparative summary of the main international references, highlighting their distinctive characteristics and areas of convergence, serving as a support for defining mitigation measures aligned with best international practices.

Table 4-2: Parameters for sizing the exclusion and monitoring zone

Jurisdiction / Entity	Guideline / Key Document	Distinctive Characteristics
IAGC/IOGP (International)	Report 579 (2017)	500 m exclusion zone; 20–40 min soft-start; PAM recommended in low visibility; globally applicable
EnerGeo Alliance	Mitigation positions; EIA Handbook	Science and risk-based measures; opposition to excessive precaution without scientific basis
JNCC (United Kingdom)	Seismic Guidelines 2017; Draft 2025	Minimum zone of 500 m (up to 2,000 m); shutdown for baleen whales; 30/60 min search depending on depth
NMFS/BOEM (USA)	Technical Guidance v3.0 (2024); ITA Rules	1,000 m monitoring zone; Southall et al. criteria; dedicated PSOs; mandatory shutdown
DFO (Canada)	Statement of Canadian Practice	Planning, operational, and post-survey measures; complementary PAM
DOC (New Zealand)	Code of Conduct	1,500 m zone monitored; mandatory MMO training and certification
Norway	Petroleum Safety Authority	Focus on soft-start; spatio-temporal restrictions for cetacean spawning and feeding grounds

In jurisdictions without specific regulation, adoption of the measures in IAGC/IOGP Report 579 is recommended as a minimum standard of good practice, supplemented by JNCC Guidelines where applicable.

4.10.2 Exclusion Zone

The exclusion zone is the area surrounding the source array seismic within which cetaceans must be monitored and, if detected, must trigger mitigation actions (Table 4-3). Its objective is to ensure sufficient protection against potential auditory injury (PTS)(IOGP/IAGC, 2017).

Table 4-3: Exclusion and monitoring zone sizing parameters

Parameter	Requirement
Standard minimum radius	500 m horizontal from the centre of the source array (IAGC/IOGP, JNCC)
Maximum radius (case-by-case)	Up to 2,000 m when impact assessment predicts greater PTS distances (JNCC 2025)
Reference point	Centre of the airgun array; for dual arrays, central point between the two arrays
Monitoring zone (BOEM/USA)	1,000 m in all directions for all marine mammal species

The 500-metre exclusion zone is widely used in most international jurisdictions and in industry best practice recommendations (Figure 4-11), both to ensure sufficient protection against injury and to simplify implementation for marine mammal observers

In certain circumstances, particularly in areas important for low-frequency cetaceans (baleen whales), a mitigation zone may be applied/exclusion of two or more levels (JNCC 2025 Draft), (Table 4-4).

Table 4-4: Exclusion and monitoring zone sizing parameters

Level	Radius	Target Species	Action
Level 1 (inner)	500 m	All cetaceans	Soft-start delay if detected before commencement
Level 2 (outer)	2,000 m	Low-frequency cetaceans (baleen whales)	Mandatory shutdown during soft-start and data acquisition

When a mitigation zone with a radius of 1 km or greater needs to be monitored, two MMOs must be available (JNCC 2025).

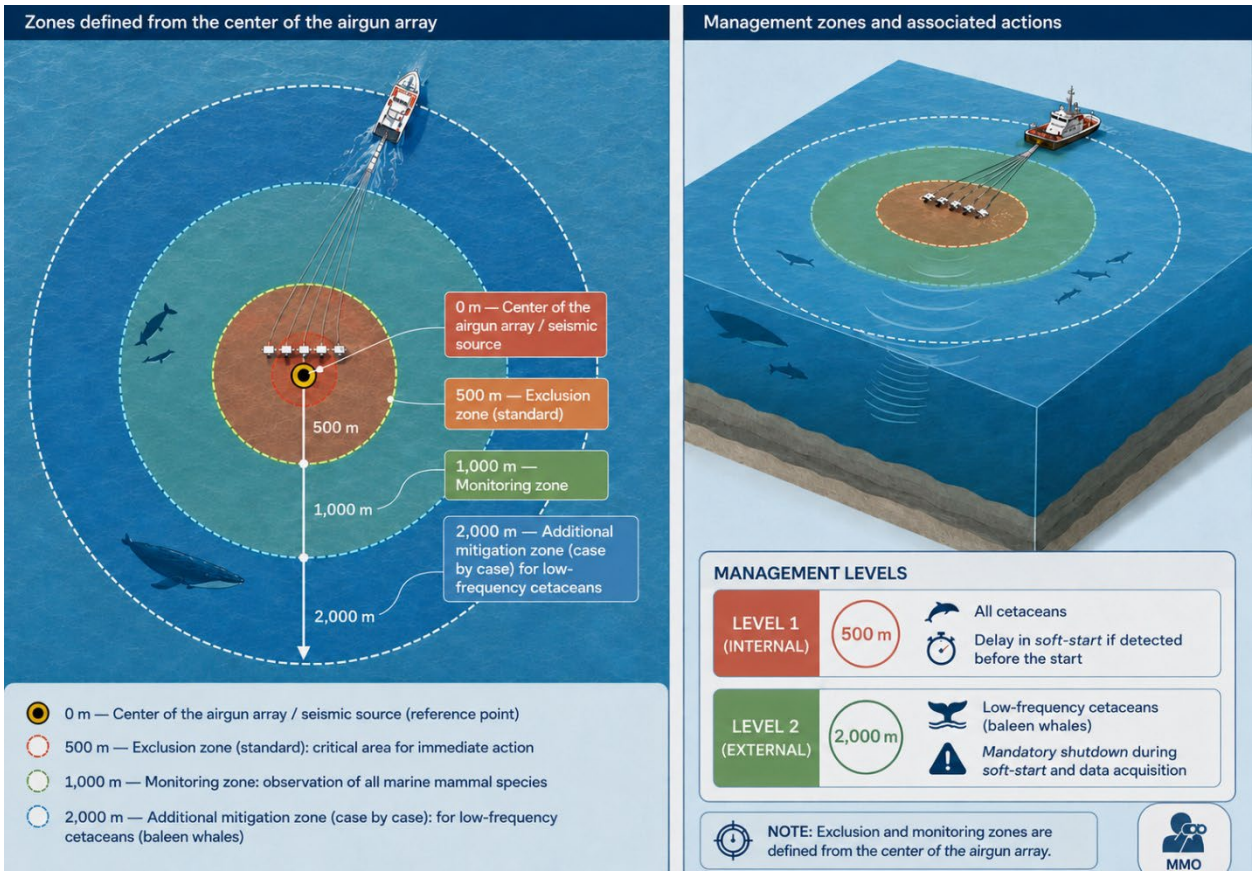


Figure 4-11: Minimum exclusion zone of 500 m, remaining zones to be defined in the EIA phase

4.10.3 Soft-Start (Ramp-Up) Procedures

The soft-start (or ramp-up) procedure aims to alert cetaceans that a sound source is increasing in intensity, allowing sufficient time for the animals to move away from the immediate vicinity before potentially harmful sound levels occur.

4.10.3.1 Standard Protocol

A soft-start (*soft-start*) complete must be performed whenever the airguns (air guns) are scheduled to operate and after any interruption due to the presence of marine mammals in the mitigation zone.

A Table 4-5 presents the recommendations of the International Association of Geophysical Contractors (IAGC) / International Association of Oil & Gas Producers (IAOP) and the Joint Nature Conservation Committee (JNCC) for the soft-start.

Table 4-5: IAGC / IAOP Recommendations for the soft-start.

Parameter	IAGC/IOGP Report 579	JNCC 2017/2025
Minimum duration	Minimum 20 min, maximum 40 min	Minimum 20 min até power total; maximum 40 min até iníline
Exception (arrays <180 in³)	N/A	Minimum 15 min; maximum 25 min
First phase	Activate the smallest volume element of the array	Start with the smallest airgun in the array

Parameter	IAGC/IOGP Report 579	JNCC 2017/2025
Subsequent phases	Double the number of active elements at the start of each phase	Progressive and uniform increase in power in stages
Phase duration	Approximately equal	Uniform, gradual increase in source level (dB)

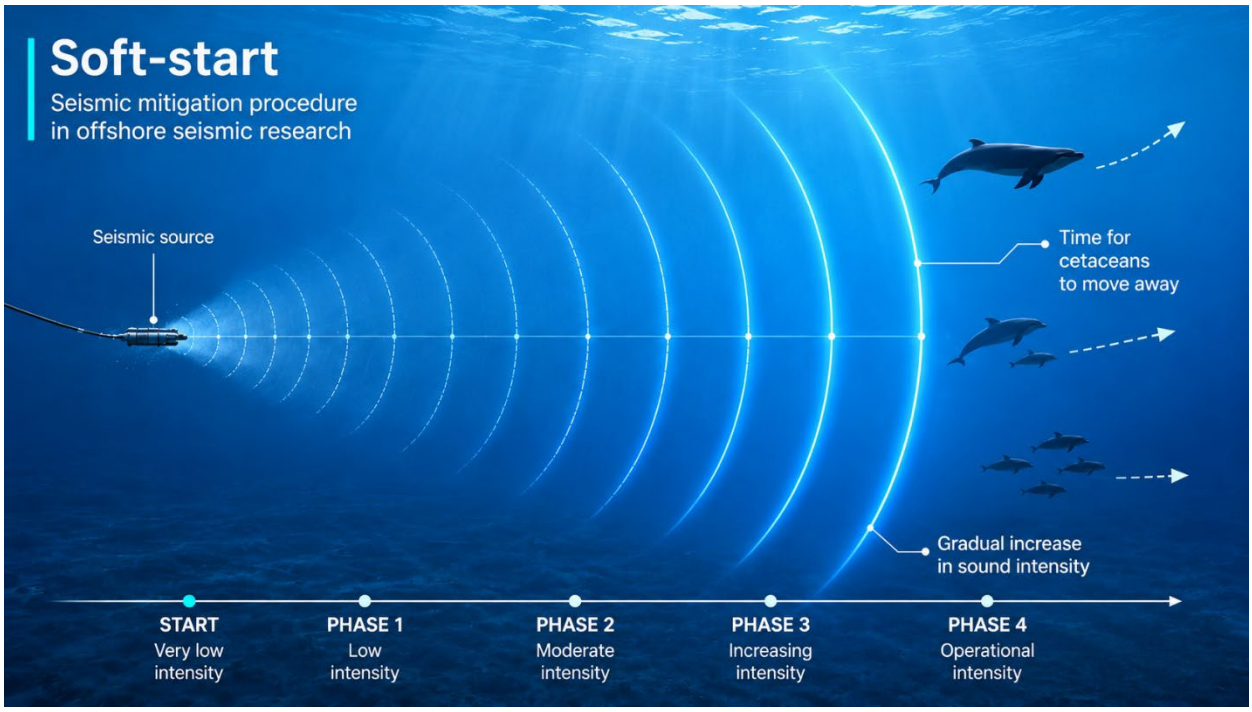


Figure 4-12: Progressive increase in sound source intensity for gradual departure of marine mammals before reaching the maximum operational parameters defined for seismic acquisition.

4.10.3.2 Interruptions and Resumption of Operations

A Table 4-6 presents the operational procedures to be adopted in situations of interruption and subsequent resumption of seismic operations, considering different shutdown scenarios, namely for technical, operational, or marine fauna detection reasons in the mitigation zone. These procedures aim to ensure the continuity of data acquisition under controlled conditions, while simultaneously minimising the risk of sudden exposure of fauna to high sound pressure levels.

The guidelines presented are based on internationally recognised best practices, specifically the recommendations of IAGC/IOGP and JNCC, establishing differentiated criteria based on the duration of the interruption and the operational context. Their application aims to ensure a gradual and safe resumption of acoustic emissions, particularly through the implementation of soft-start procedures, whenever applicable, ensuring adequate protection of marine mammals and compliance with mitigation requirements.

Table 4-6: Procedures in case of interruption and subsequent resumption of operations

Situation	Procedure
Siêlence ≥ 20 min (IAGC/IOGP)	Use full soft-start procedure to resume operations
Siêlence < 20 min (IAGC/IOGP)	Resume operations without soft-start
Unplanned delay < 10 min (JNCC 2025)	No need for soft start; resume to the same power level, provided there are no detections in the mitigation zone

Situation	Procedure
Unplanned delay > 10 min (JNCC 2025)	Full pre-shoot search (20 or 40 min depending on depth) and soft start complete
Line change > 40 min (JNCC)	Terminate shoot; new pre-shoot search; soft start 20 min complete
Line change < 40 min (JNCC 2025)	Shoot may continue if power reduced to 180 in^3; SPI increased (max. 5 min); mini soft start in the last 10 min

4.10.4 Passive Acoustic Monitoring

PAM is the only system currently available capable of detecting underwater cetaceans, being of particular importance for detecting deep-diving species such as sperm whales and beaked whales. It is especially relevant during periods when visual monitoring is not possible.

According to JNCC (2017/2025) guidelines and IAGC/IOGP recommendations, PAM should be used in the following circumstances:

- Sea state Beaufort 4 or higher (choppy sea with many white caps)
- Visibility reduced to the point where the entire mitigation zone cannot be clearly observed
- Insufficient light levels for visual observation without artificial illumination
- Night-time periods when operations are intended to commence
- Areas of importance for marine mammals (complementing visual surveillance)
- Deep waters (>200 m), complementing visual searches for prolonged diving species

The towed PAM system must offer the functionalities presented in the Table 4-7 to allow interpretation of acoustic data and support timely decision-making (IAGC PAM Guidance 2014; IOGP Report 579)

Table 4-7: RPAM system technical requirements and functionalities

Functionality	Description
Multi-hydrophone processing	Ability to process data from multiple hydrophones in real-time or near real-time; flexible user-defined configurations
Spectrogram displays	Identification of received signal characteristics from multiple marine mammal species
Mapping displays	Azimuth and range to sounds of interest relative to the tow line, source location, and exclusion distances
Automatic and manual detection	User-selectable settings for automatic and manual detection options
Data archiving	User-defined sampling and management options for data archiving
Documentation	Operation manuals and explanation of detection, classification, and localisation algorithms

To ensure continuous 24-hour coverage, particularly in sensitive areas, a minimum of two PAM operators is required. These operators must possess specialised training in PAM software and the ability to troubleshoot technical issues onboard.

PAM generally has limitations in detecting certain species, namely seals and some cetaceans, such as baleen whales, and may also have reduced range for other species, such as the boto. Nevertheless, it constitutes a viable and relevant monitoring method for vocal species, especially during periods or conditions when visual monitoring is not possible, as indicated in the JNCC PAM Guidance.

Figure 4-13: PAM Operator and System (example)

4.10.5 Visual Monitoring

The tables in the following sections summarise the main operational requirements applicable to visual monitoring by MMO, based on recognised international references, namely IAGC/IOGP Report 579 and JNCC guidelines (2017/2025). These guidelines define the minimum procedures to be adopted before the start of seismic operations, as well as the qualification, independence, and sizing criteria for observation teams.

It is important to highlight that these requirements should be interpreted as a framework of good practices, and may be adjusted according to the specific characteristics of the study area, ecological sensitivity, and the conclusions of the environmental impactoassessment.

4.10.5.1 Pre-shoot Psearch

The pre-shoot search is a critical step in the process of mitigating impacts associated with seismic acquisition, ensuring that the exclusion zone is free of marine mammals before the acoustic sources are activated. This procedure aims to reduce the risk of exposure to potentially harmful sound levels, allowing for the timely detection of cetaceans and the application of appropriate operational measures, such as delaying the soft-start. (Figure 4-14).

The applicable requirements vary depending on water depth, the ecological characteristics of the area, and the adopted regulatory framework.

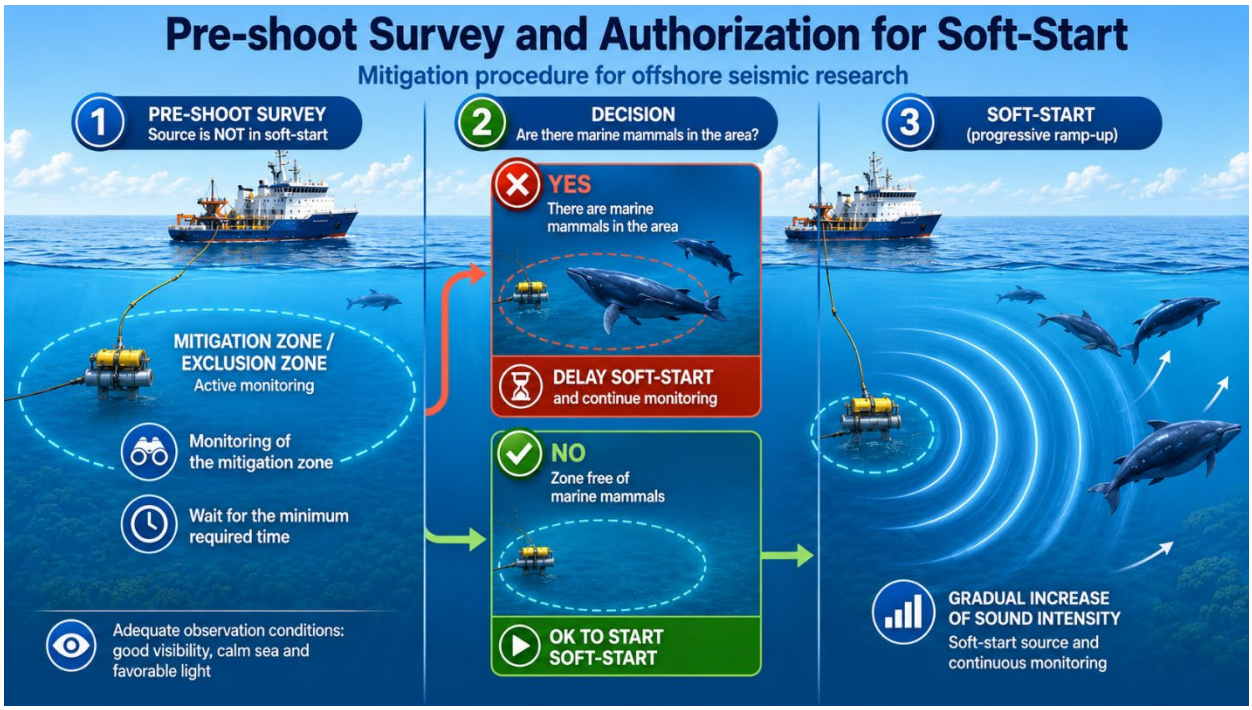


Figure 4-14 Schematic of pre-shoot search and authorisation for soft-start

A Table 4-8 summarises the main criteria defined in international references, namely in IAGC/IOGP Report 579 and JNCC guidelines, providing a technical reference for the implementation of this procedure in an operational context.

Table 4-8: Operational requirements for conducting the pre-shoot search

Parameter	IAGC/IOGP Report 579	JNCC 2025 Draft
Depth < 200 m	Min. 30 min	Min. 30 min
Depth > 200 m	Min. 30 min	Min. 60 min (deep diving species)
If cetaceans detected in the exclusion zone	Delay soft-start min. 20 min after last observation	Delay min. 20 min (<200 m) or 30 min (>200 m) after last detection
Observation conditions	Observers with no other tasks during the watch	Suitable weather conditions; elevated position with clear view of the horizon

4.10.5.2 MMO Qualifications

The effectiveness of visual monitoring during seismic operations depends directly on the qualification, experience, and independence of the MMOs. These professionals play a critical role in implementing mitigation measures, particularly in the early detection of cetaceans and in making operational decisions related to the start, suspension, or resumption of seismic activities.

In this context, international guidelines establish minimum requirements regarding technical training, practical experience, exclusive dedication to the role, and independence from the operator, in order to ensure the reliability of observations and the integrity of the environmental monitoring process. (Table 4-9).

Table 4-9: Qualification, experience, and independence requirements of MMO

Requirement	Description
Training	Training on a JNCC-approved course or equivalent; proficiency in mitigation, navigation, and species identification requirements

Requirement	Description
Dedication	No other tasks or distractions during observation duty (IAGC/IOGP, JNCC)
Experience (JNCC)	For sensitive areas: 20 weeks of experience in UK waters in the last 10 years
Independence	It is recommended that observers are not directly employed by seismic companies to avoid conflicts of interest
Minimum number	1 MMO for 500 m zone; 2 MMOs for ≥ 1,000 m zone (JNCC 2025)
Newly qualified	Should not work alone on first missions (JNCC)

4.10.6 Shutdown Procedures

Shutdown procedures constitute the most direct mitigation mechanism when a cetacean is detected within the exclusion zone. Application varies depending on the jurisdiction and the species involved.

The JNCC Guidelines 2025 (draft) introduce specific shutdown requirements for baleen whales (low-frequency cetaceans), recognising their greater auditory sensitivity to typical airgun frequencies.

A Table 4-10 presents the operational requirements applicable to shutdown in the presence of low-frequency cetaceans, as defined in the JNCC guidelines (2025 draft), systematising the criteria for activation, duration, and conditions for resuming operations.

Table 4-10: Shutdown requirements for low-frequency cetaceans

Parameter	Requirement (JNCC 2025 Draft)
Mitigation zone	2,000 m for baleen whales (two-tier zone)
Action upon detecting baleen whale	Immediate shutdown of seismic sources
Application	During soft-start and during full-power data acquisition
Delay duration	Up to 60 minutes after last sighting in the mitigation zone
Resumption	Full soft-start after confirmation the animal has left the zone or after 60 min
Night operations	PAM mandatory; consider infrared technology (baleen whale detection via PAM is problematic)
Team required	Continuous monitoring of the 2 km zone during soft-start and acquisition

In the context of IAGC/IOGP Report 579, the approach is more general: if a cetacean moves within the 500 m exclusion zone after the array is operating at full capacity, it is considered that the sound pressure level is not negatively impacting that particular animal.

4.10.7 Data Logging and Reporting

Rigorous documentation of all observations, as well as details of monitoring effort and relevant operations, is essential for scientific assessment and to ensure regulatory compliance.

The content of the mitigation report (MMO Report) should include:

- Operator details: company, contractor, and licence reference;
- Details of seismic acquisition: dates, location, sound sources (number and volume of airguns, frequency, intensity in dB, firing interval);
- Mitigation requirements: exclusion zone radius, shutdown requirements, search duration and any agreed deviations;

- Details of MOM/PAM: number of operators, dedicated or not dedicated, experience, onboard location and PAM equipment characteristics;
- Procedure application: summary of actions taken, soft-starts, delays and confirmation of compliance;
- Marine mammal observations: species, numbers, distances, behaviour and operational context;
- Additional information: photographs, technical issues, deviations and corrective actions.

Regarding standardised recording forms, in the absence of national reporting templates, monitoring data should be documented using internationally recognised forms, such as those developed by the IOGP E&P *Sound and Marine Life Joint Industry Programme* (JIP), subsequently adopted by the UK JNCC.

All cetacean observations, as well as details of monitoring effort and relevant operations, must be documented electronically and made available externally to environmental authorities within a reasonable timeframe after the completion of the seismic acquisition.

4.11 Timeline

The following figure presents an indicative, preliminary timeline for the proposed seismic survey. The seismic campaign is estimated to have a total duration of approximately eight months (32 weeks), with an expected start in late 2026 / early 2027.

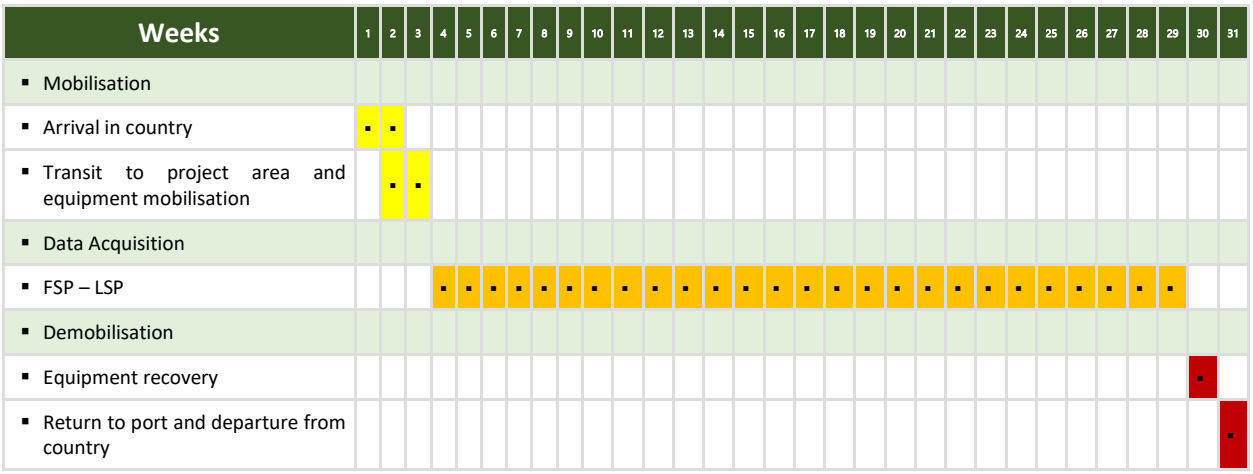


Figure 4-15: Overall project timeline

4.12 Investment

The estimated investment value for the proposed seismic acquisition is 70.000,000 USD

5 DESCRIPTION OF THE BIOPHYSICAL AND SOCIOECONOMIC ENVIRONMENT

5.1 Climate

5.1.1 Climatic Setting

Mozambique is located on the eastern coast of the African continent, between latitudes 10°27'S and 26°52'S and longitudes 30°12'E and 40°51'E, occupying an extensive coastal strip washed by the Indian Ocean. The territory falls within the transition zone between tropical and subtropical domains, its climate regime being fundamentally conditioned by its latitudinal position, the influence of the Mozambique Channel, and the interaction between air masses of equatorial and subtropical origin.

In seasonal terms, two main seasons are recognised: a hot and humid season, generally between October and April, and a cool and dry season, between May and September. Precipitation is unevenly distributed across the territory, being generally higher in the north and in mountainous areas, while the central coastal strip typically has annual totals within humid to sub-humid tropical regimes. This seasonality is relevant for the planning of offshore activities, as the rainy season coincides with the period of greatest atmospheric instability and the regional cyclone season.

According to the Köppen-Geiger climate classification, the coastal region adjacent to the seismic survey area falls under the Aw climate type – tropical savanna climate. This climate type is characterised by high average temperatures throughout the year, a coldest month average temperature equal to or greater than 18 °C, a well-defined dry season, and precipitation concentrated in the wet season (Peel et al., 2007; World Bank/CCKP, climatology 1991-2020).

5.1.2 Temperature and Precipitation

In the project's regional setting, seasonal temperature ranges are moderate, around 8 °C between the cooler and warmer months. Compiled information indicates that, for the Inhambane region, average monthly temperatures vary between values close to 21 °C in the cooler months (June to August) and around 27 °C to 27.3 °C in the warmer months, particularly January and February. Precipitation shows strong seasonality, with over 80% of the annual total concentrated in the December-February period and minima at the end of the dry season, especially August or September.

Regional data show differences between sources, explainable by the spatial scale, series type, and location of the station or climate cell used. The average annual precipitation is around 735 mm for the evaluated region based on 30-year climatological series from the World Bank Climate Change Knowledge Portal (1991-2020). The Vilankulo Meteorological Station and 30-year climatological series from INAM indicate a total annual precipitation of about 830 mm, with February as the wettest month (176.6 mm) and September as the driest month (16.6 mm).

For the offshore environment, data from NASA/POWER CERES-MERRA-2 for a point located approximately 40 nautical miles off the coast of the Inhassoro district (Lat. 21.468 S; Long. 36.01 E), for the period 2001-2020, indicated an average annual air temperature at 2 m of 25.35 °C, with monthly average variation between 22.97 °C in July and 27.69 °C in February. The average annual minimum temperature indicated was 17.44 °C and the average annual maximum temperature was 29.82 °C. These values should be understood as offshore reanalysis/climatology data and not as local in situ measurements within the seismic acquisition area.

5.1.3 Atmospheric Circulation and Wind Regime

In the central-south region of Mozambique, the wind regime is controlled by the atmospheric circulation of the Indian Ocean, being dominated by Southeast trade winds and easterly quadrant flows. These winds show significant seasonal variations: in the warm and rainy season, the southward displacement of the Intertropical Convergence Zone favours greater humidity, atmospheric instability, and precipitation; in the dry season, the intensification of subtropical high-pressure systems contributes to more stable conditions and more persistent Southeast winds.

In the acquisition area seismic, winds blow predominantly from the Southeast (SE), with an annualised frequency of 22.7%, followed by the SSE direction with 16.4%. The average annual wind speed, measured at 10 metres height and approximately 40 nautical miles from the coast, is 4.84 m/s (≈ 17.4 km/h).

The monthly variation in average speeds is relatively contained, between 5.3 m/s and 6.2 m/s, which reflects a moderate and relatively stable wind regime throughout the year. The notable aspects are:

- Higher intensity: January to March (5.9–6.2 m/s on average), with maximum hourly peaks of 19.5 to 22.7 m/s recorded in January
- Lower intensity: May–June (5.3–5.4 m/s on average), with a minimum hourly speed of 12.8 m/s in May
- Dominant annual class: 3.0–4.4 m/s, with a frequency of 28.8%, followed by 1.5–3.0 m/s with 15.3%
- Global average annual speed: 5.8 m/s at 10 m height

These data is relevant for: (i) seismic campaign operational window (May–June presents more favourable conditions); (ii) dispersion of atmospheric emissions from vessels; (iii) drift modelling in accidental spill scenarios; and (iv) assessment of operational risks associated with strong winds in the Jan–Mar period, which may condition soft-start operations and MMO/PAM monitoring.

5.1.4 Activity Cyclonic and Winds Extreme

The Mozambican coast, and in particular the central region, constitutes one of the most vulnerable areas of the African continent to the incidence of tropical cyclones. The cyclone season in Mozambique usually runs between November and April, coinciding with the rainy season. The Southwest Indian Ocean basin generates about 10% of all tropical cyclones on the planet annually, affecting Mozambique with an average frequency of one cyclone per year, in addition to three to four depressions or tropical storms of lesser intensity.

The central region of the country, where the seismic acquisition area is located presents a high frequency of occurrence of these extreme phenomena, as evidenced by the historical record of the National Institute of Meteorology (INAM).

Preliminary consultation of the NOAA Historical Hurricane Tracks / IBTrACS database for the period 2015–2025 indicates the recurrent occurrence of tropical systems in the Mozambique Channel and the south-central coastal region of Mozambique, including events of high intensity (Table 5-1). This data confirms that the region is exposed to seasonal cyclonic risk, especially during the hot and humid season, and the planning of the mobilisation, operation, and demobilisation phases should consider specific procedures for meteorological monitoring, oceanic forecasting, safe interruption of operations, and response to adverse meteo-oceanographic conditions.

Table 5-1: List of cyclones e tropical storms identified for south-central Mozambique and the Mozambique Channel (2017 – 2025)

Year	System	Maximum wind in the regional stretch, kt / km/h	Indicative IBTrACS / Saffir-Simpson Category
2017	Dineo	75 / 139	C2 - Most intense cyclone, with potential for significant damage (154–177 km/h)
2019	Desmond	35 / 65	Tropical Tstorm - Before reaching cyclone/hurricane category (63–118 km/h)
2019	Idai	105 / 194	C4 - Very intense cycloneo (209–251 km/h)
2021	Chalane	60 / 111	C1 - Least intense tropical cyclone on the scale (119–153 km/h)
2021	Eloise	80 / 148	C2 - Most intense cyclone, with potential for significant damage (154–177 km/h)
2021	Guambe	80 / 148	C2 - Most intense cyclone, with potential for significant damage (154–177 km/h)
2022	Batsirai	43 / 80	Tropical Tstorm - Before reaching cyclone/hurricane category (63–118 km/h)
2022	Jasmine	60 / 111	C1 - Least intense tropical cyclone on the scale (119–153 km/h)
2023	Cheneso	75 / 139	C1 - Least intense tropical cyclone on the scale (119–153 km/h)
2023	Freddy	85 / 157	C3 - Intense cyclone / large cyclone (178–208 km/h)
2024	Alvaro	55 / 102	Storm Ttropical - Before reaching cyclone/hurricane category (63–118 km/h)
2024	Filipo	55 / 102	Storm Ttropical - Before reaching cyclone/hurricane category (63–118 km/h)
2025	Dikeledi	75 / 139	C1 - Tropical cyclone of lesser intensity on the scale (119–153 km/h)
2025	Honde	55 / 102	C1 - Tropical cyclone of lesser intensity on the scale (119–153 km/h)

Classes C1 to C5 correspond to the intensity categories of tropical cyclones according to the Saffir-Simpson Wind Scale, defined based on maximum sustained wind speed. Category C1 represents cyclones of lesser relative intensity, while category C5 corresponds to the most intense systems. This classification is a useful indicator of potential wind-related severity, but should be interpreted in conjunction with other meteorological and oceanographic parameters, including precipitation, atmospheric pressure, swell, storm surge, and system trajectory.

5.1.4.1 Climate Change

Mozambique is considered one of the most vulnerable African countries to climate change, due to its extensive coastline, exposure to tropical cyclones, floods, droughts, coastal erosion, and socio-economic dependence on climate-sensitive sectors such as fishing, agriculture, and coastal tourism. In the central-southern region of the country, including the coast of Sofala and Inhambane and the adjacent sector of the Mozambique Channel, this vulnerability is particularly relevant for offshore projects, as meteorological and oceanographic conditions directly condition maritime safety, navigability, operational planning, and emergency response.

Available climate projections indicate a trend of increasing average temperature in Mozambique throughout the 21st century. For the central-southern zone, this trend may translate into greater thermal stress, changes in evaporation patterns, and potential intensification of atmospheric instability episodes, especially during the hot season. Although an offshore seismic campaign is temporary and short-lived,

increased climate variability may affect the predictability of operational conditions, requiring greater robustness in meteo-oceanographic planning and in the criteria for safe suspension of activities.

From an environmental perspective, climate change constitutes a cumulative pressure factor on marine and coastal ecosystems. Seawater warming, extreme events, salinity changes, coastal habitat disturbances, coral bleaching, mangrove degradation, and changes in species distribution can increase the sensitivity of ecological receptors to temporary disturbance caused by human activities. Thus, although seismic research is not, in itself, a determining factor of climate change, the assessment of impacts must recognise that environmental receptors may already be subject to pre-existing climate stress.

In the case of coastal communities, the relevance is also indirect. Artisanal fishing, semi-industrial fishing, coastal tourism, and food security are sectors vulnerable to climate variability, the occurrence of cyclones, and changes in sea conditions. Any temporary interruptions of maritime activities associated with the Project should, therefore, be assessed considering a socio-economic context already exposed to recurrent climate risks. This approach is particularly important to avoid underestimating cumulative impacts on maritime space users.

Table 5-2: Relevance of climate change for the planning and management of offshore seismic operations

Relevant climatic aspect	Implication for the Project
Tropical cyclones and severe storms	Interruption of operations, risk to vessels, streamers, and crew
High swell and strong winds	Conditioning of seismic acquisition, manoeuvres, and navigation
Intense precipitation and extreme coastal events	Disruption of logistics bases, ports, and access routes
Temperature increase and climate variability	Greater unpredictability of meteo-oceanographic conditions
Cumulative pressures on ecosystems and fisheries	Greater sensitivity of environmental and social receptors

5.2 Oceanography

5.2.1 Oceanic Circulation in the Mozambique Channel

The North Indian Ocean is the only tropical ocean completely enclosed to the north, bounded by the Eurasian continental mass. This geographical configuration prevents the formation of water masses in the polar regions of the Northern Hemisphere and makes it impossible for accumulated heat to be exported to high latitudes via oceanic transport. Consequently, the dynamics of this ocean are dominated by the South Asian monsoon regime, with a complete seasonal reversal of surface winds: southwest monsoon (June–September) and northeast monsoon (December–February).

The natural boundary between the North and South Indian Oceans lies approximately at 10°S, which corresponds to the bifurcation region of the South Equatorial Current (SEC). South of this parallel — where the Mozambique Channel is located — circulation is relatively stable throughout the year, in contrast to the strong seasonality to the north.

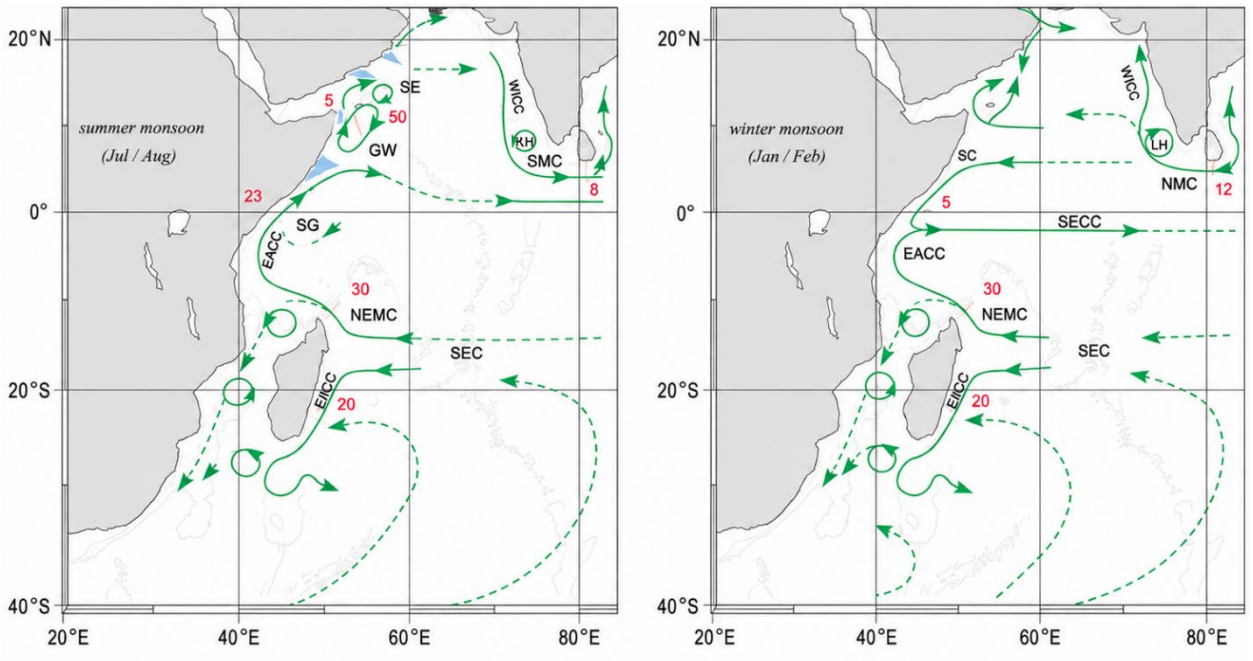
The Mozambique Channel constitutes an oceanographic element of determining importance for any offshore seismic acquisition project in the Mozambican EEZ. It separates the continental territory of Mozambique from the island of Madagascar, with a minimum width of approximately 400 km, and its circulation dynamics directly condition the propagation of underwater noise, the dispersion of accidental

effluents, the distribution of sensitive marine organisms (mammals, turtles, fish), and the connectivity between benthic and pelagic habitats.

Circulation within the Channel is predominantly oriented southwards, connecting upstream the circulation driven by monsoons in tropical regions and, downstream, the inter-oceanic exchange system around Southern Africa — the Agulhas Current System. The Mozambique Current, carrying warm surface waters, flows close to the coast near Mossuril and Cabo das Correntes, reaching its maximum speed during the northeast monsoon (October–November).

A fundamental aspect, widely documented in contemporary literature, is that this meridional transport is not carried out by a continuous, near-laminar boundary current, but rather, predominantly, by migratory anticyclonic eddies that move south along the Channel.

A Figure 5-1 illustrates the surface oceanic circulation in the Tropical Indian Ocean during the boreal summer monsoon (July/August, left panel) and the boreal winter monsoon (January/February, right panel). Solid arrows indicate permanent or seasonally active surface currents; dashed arrows indicate weaker or variably expressed currents. Red values correspond to estimates of transport in Sverdrup (Sv). The main current systems relevant to the Mozambique Channel region are also identified: South Equatorial Current (SEC), Northeast and Southeast Madagascar Currents (NEMC and SEMC), and East African Coastal Current (EACC). Adapted from Schott et al. (2009). main current systems relevant to the Mozambique Channel region are also identified: South Equatorial Current (SEC), Northeast and Southeast Madagascar Currents (NEMC and SEMC), and East African Coastal Current (EACC). Adapted from Schott et al. (2009).



Fonte: Schott *et al*, 2009

SEC - Corrente Equatorial Sul;
SECC Contracorrente Equatorial Sul;
NEMC e **SEMC** – Correntes Nordeste e Sudeste de Madagáscar;
EACC – Correntes costeiras africanas orientais;

SC – Corrente Somali;
SG - Gyre Sul;
GW – Great Whirl;
SE - zonas de *upwelling* Socotra Eddy;
RH – Ras al Hadd Jet;

WICC – zonas de *upwelling* de Omam e da Corrente Costeira Ocidental Índica;
LH e **LL** – Laccadive High e Low;
EICC – Corrente Costeira do índico Oriental;
SMC e **NMC** – Correntes de Monção Sudoeste e Nordeste; JC – Conte Sul de Java;
LC – Corrente de Leeuwin

Figure 5-1: Surface ocean circulation in the Tropical Indian Ocean during the boreal summer monsoon (July/August, left panel) and the boreal winter monsoon (January/February, right panel).

South of Maputo, the Mozambique Current converges with the East Madagascar Current, forming the Agulhas Current - one of the most powerful western boundary currents in the Southern Hemisphere (Johnsen et al., 2008).

Coastal Circulation and Sofala Bank

Large-scale counter-currents form in the coastal indentations of Sofala and Maputo, which manifest in the northward orientation of the most characteristic Mozambican peninsulas — Machangulo/Santa Maria, Inhambane, and São Sebastião/Bazaruto. This pattern has direct implications for the distribution of sediments, nutrients, and planktonic organisms.

High-resolution numerical modelling (Malauene et al, 2018) demonstrated that offshore Channel vortices directly control circulation on the Sofala Bank shelf:

- Anticyclonic vortices near the shelf induce northward boundary currents on the shelf;
- Cyclonic vortices reverse this pattern;
- The plumes of the Zambezi, Pungué, Buzi, and Save rivers interact with the vortices, determining the extent and direction of dispersal of nutrient-rich river plumes.

The highest concentrations of surface nutrients are recorded on the Angoche shelf (north), Sofala Bank (centre), and Delagoa Bay (south), directly influencing the distribution of commercially important fish, cephalopod, and crustacean communities.

5.2.2 Tidal Regime

Off Inhambane, the tidal and swell regime constitutes a relevant meteo-oceanographic constraint for the planning of an offshore seismic acquisition campaign, particularly concerning navigation safety, towed equipment stability, support vessel operations, definition of operational windows, and emergency management.

Tides along the Mozambican coast exhibit a predominantly semi-diurnal regime, with two high tides and two low tides in each approximate 24-hour cycle. In the Inhambane region, the diurnal inequality is relatively moderate, around 10 to 20 cm, being lower than that observed in sectors such as Beira, where the tidal range is substantially greater. In open water, water level variations associated with tides tend to have a limited influence on the seismic acquisition itself; however, they remain relevant for support operations, approaches to ports, anchorages, coastal areas, personnel or material transfers, and navigation in shallower zones.

In the coastal environment of Inhambane and the Bazaruto Archipelago, tides can assume greater local importance, as the coastal morphology, the presence of islands, channels, and sandbanks favour the occurrence of significant tidal currents. In the Bazaruto Archipelago region and adjacent operational area, the tidal range can reach about 3 m during normal spring tides and about 4.4 m during equinoctial spring tides, contributing to strong tidal flows and the maintenance of the network of sandbanks and deep channels. These aspects are particularly relevant if coastal logistical bases, support routes near the archipelago, or navigation areas in shallower waters are used.

5.2.3 Swell

O The Mozambique Channel receives energy from different sources: swell of southern origin, generated in the Southern Indian Ocean / Antarctic Ocean, swell generated to the north by tropical and monsoonal systems, and local waves associated with trade winds and regional winds. The interaction between these components can increase or reduce wave height during certain periods, resulting in a variable sea state

regime. Eln January, swell penetration of Australian origin tends to be lower, with waves generated by east/southeast winds predominating, with significant heights of the order of 1.6 to 1.8 m.

The data presented by Sitoe et al. (2023), based on weekly series of significant wave height and wave period in the Mozambique Channel, indicate that the coastal area of Inhambane presents some of the highest values on the western side of the channel. For Inhambane, the average significant height is indicated as approximately 2.0–2.1 m, with an approximate standard deviation of 0.7 m, potentially reaching maximum values close to 4.6–5.0 m during storm conditions. The average wave period in Inhambane is reported as approximately 8.1 s, with values ranging between approximately 5.1 s and 12.8 s. This data is useful for preliminary framing, although it should be interpreted with caution as it results from aggregated data and a coastal/regional analysis, not necessarily coinciding with the exact offshore seismic acquisition polygon.

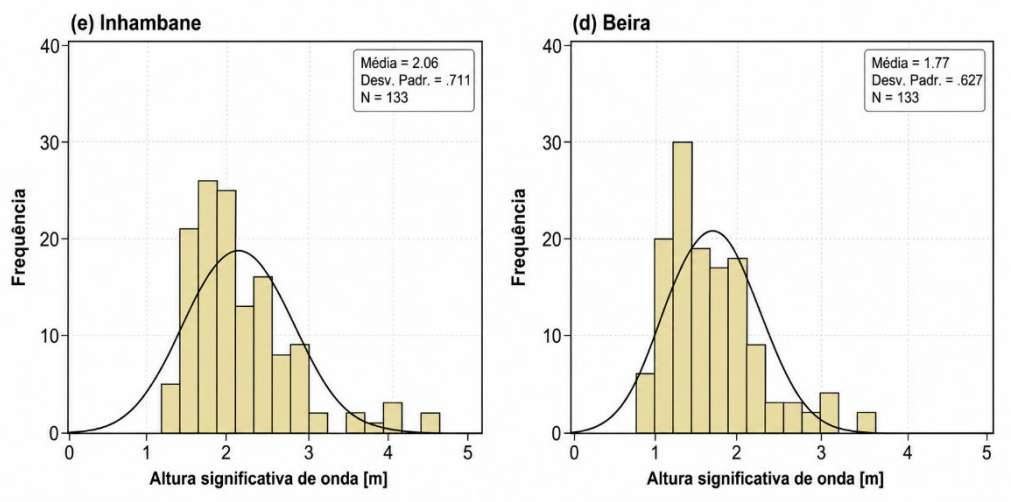


Figure 5-2: Significant wave heights in Inhambane and Beira

From a seasonal perspective, swell tends to be higher during the austral winter, when swell generated by higher-latitude systems propagates northwards through the Mozambique Channel. In contrast, during part of the warm season, swell may be more associated with local winds and tropical systems. However, during the cyclone season, short-lived events can generate severe sea conditions, with a rapid increase in wave height, greater sea state irregularity, and increased risk for offshore operations.

For a 3D seismic acquisition campaign, the operational relevance of swell is greater than that of tides in open water. High sea states can affect the stability of the seismic vessel, the safety of manoeuvres, the tension and geometry of streamers, the quality of acquired data, the operation of seismic sources, and the visual monitoring capability by Marine Mammal Observers. They may also necessitate temporary suspension of acquisition, trajectory alteration, partial equipment retrieval, or precautionary withdrawal in case of approaching storms.

5.2.4 Mozambique Channel Bathymetry

The Mozambique Channel presents a complex underwater morphology, a result of its long geological history. It is a rift structure formed over 180 million years ago, during the separation of Madagascar (then united with Australia, India, and Antarctica) from the African continent, constituting one of the oldest passive continental margins on the planet.

A Figure 5-3 illustrates the bathymetry in the seismic acquisition area.

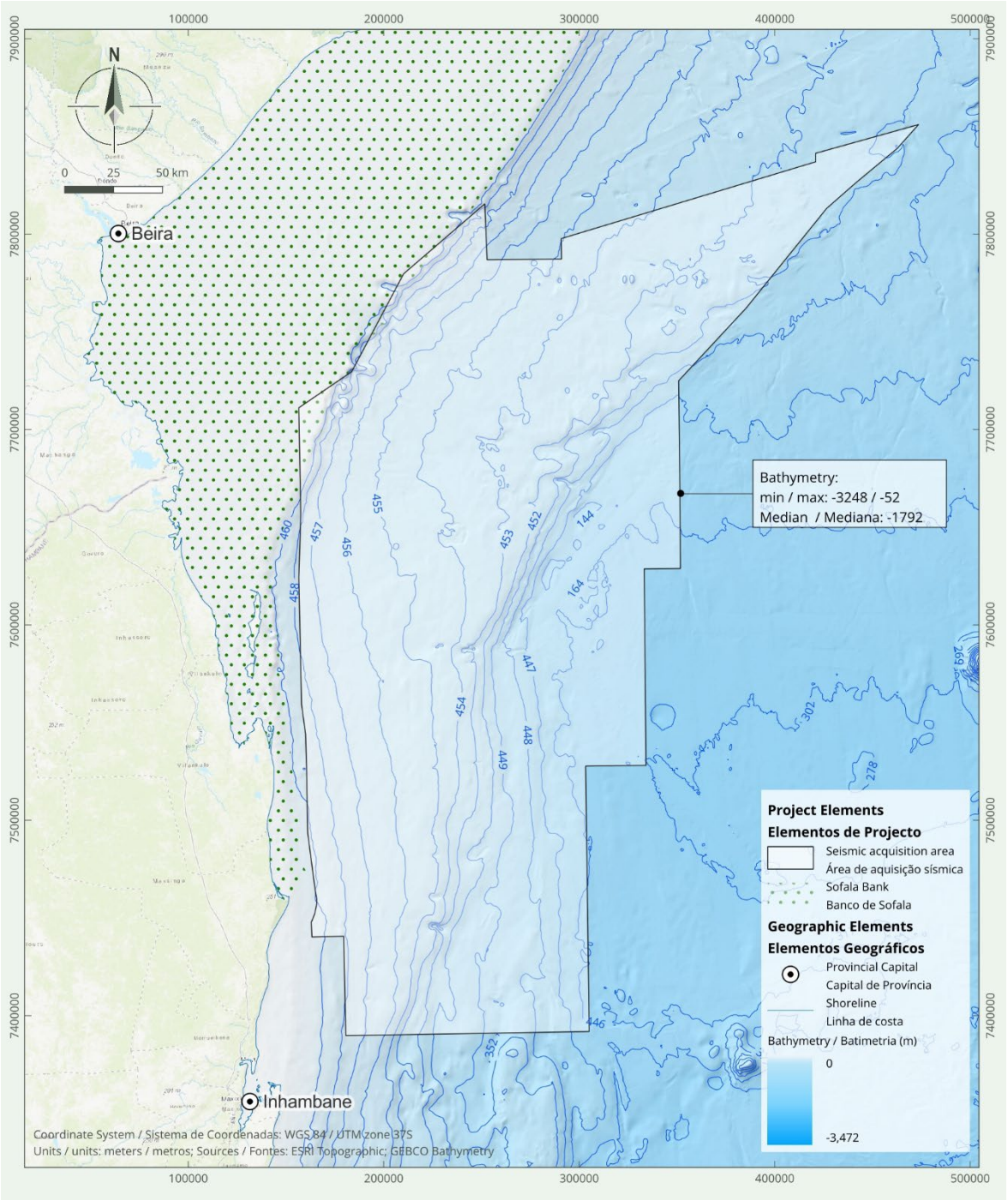


Figure 5-3: Bathymetry of the seismic prospecting areas seismic

The channel is delimited by deep abyssal basins: the Somalia Basin, to the north, with depths reaching 5100 m, and the Mozambique Basin, to the south, with depths of approximately 5000 metres. The central region of the channel presents shallower seabeds, of the order of 3000 m, as a result of relatively recent tectonic activity along the Davie Fracture Zone. This activity originated a chain of seamounts designated as the Davie Ridge (or Sakalava Seamounts), which extends in a north-south direction between latitudes 13°S and 18°S.

The Davie Ridge originated from ancient continental fractures remaining from the separation of Madagascar. Although its peaks are currently about 300 metres below sea level, geological evidence suggests that about 30 to 60 million years ago, these formed emergent islands.

5.3 Marine Biological Environment

5.3.1 Coastal and Marine Ecosystems and Habitats

The coast of Mozambique has an approximate length of 2,700 km and, ecologically, is divided into three distinct regions, as defined in Pereira et al. (2014). The study area falls within the transition between two of these biogeographic regions: the Marshy Coast (central ecoregion, from Angoche to the Bazaruto Archipelago) and the Parabolic Dune Coast (from Bazaruto Island to Ponta do Ouro), as classified by Spalding et al. (2007) in their bioregionalisation of coastal and shelf zones worldwide.

According to Spalding et al. (2007), the coastal region of Inhambane is part of the East African Marine Ecoregion (EAME), which extends for about 4,600 km and includes the territorial waters of Somalia, Kenya, Tanzania, and Mozambique, constituting an ecological unit with sufficiently cohesive faunistic, floristic, and environmental characteristics to be treated as such. Within this EAME, priority biodiversity conservation sites have been identified, including Sofala Bay, classified as regionally important, and Bazaruto Island, classified as globally important (EAME, 2004).

In the study area and its immediate coastal surroundings, four main types of habitats occur: coral reefs, mangroves, seagrass meadows, and open sea (pelagic ecosystem). (Figure 5-4). The first three are located in shallow coastal waters, on the islands, and along the shores of the Bazaruto Archipelago, and are not within the operational area of seismic research, which takes place at depths greater than 200 m. The open sea pelagic ecosystem constitutes the dominant habitat in the operational area.

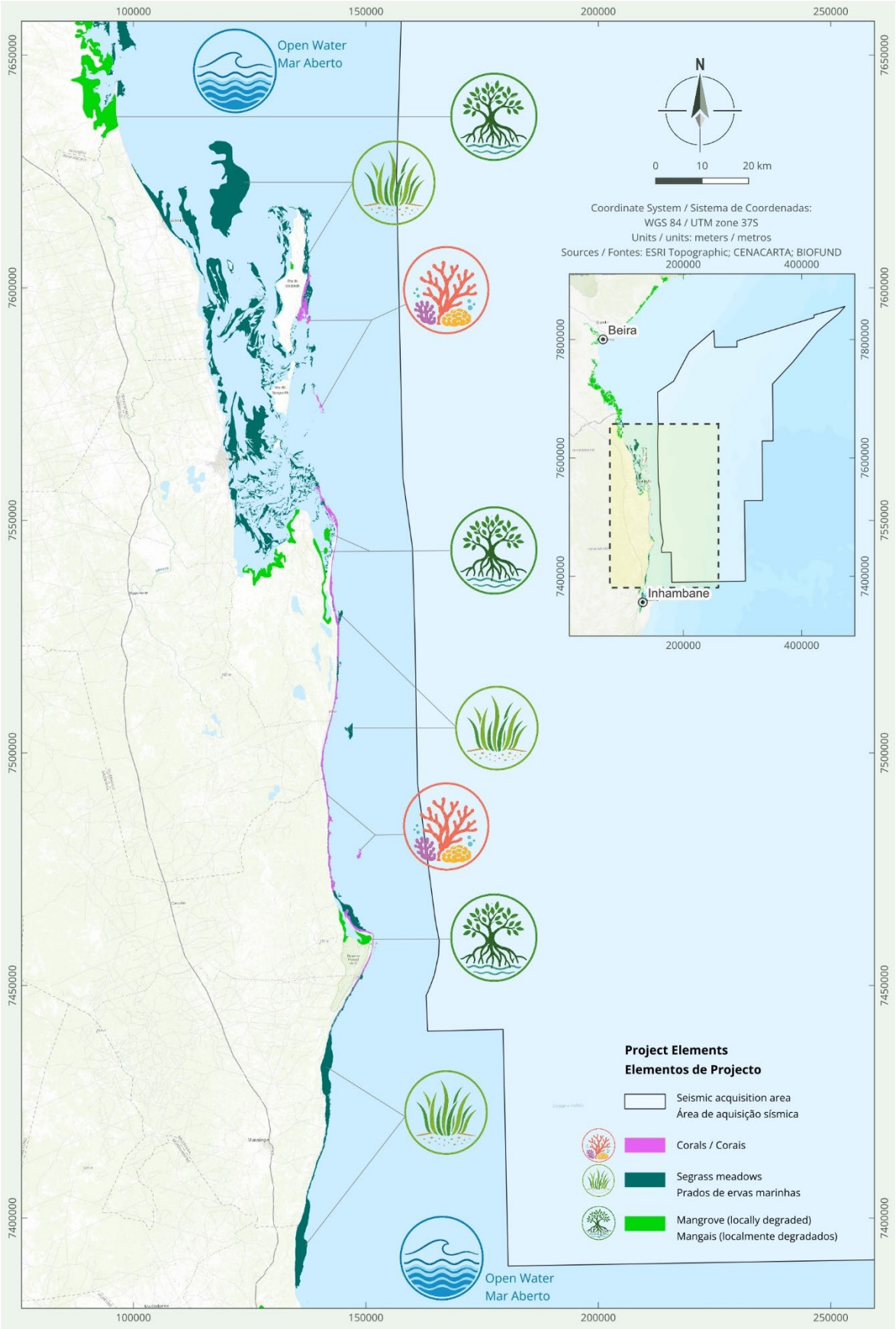


Figure 5-4: Habitats adjacent to the research area

5.3.1.1 Coral Reefs

The coastline of Mozambique is characterised by different types of coral reefs, covering an estimated total area of 1,290 km² (Rodrigues et al., 2000). The most extensive reefs are concentrated in the Northern Zone, considered true coral reefs and dominated by hard corals (Schleyer et al., 1999). There are about 181 species of soft and hard corals in the country, belonging mainly to the families Acropora, Porites, Pocilloporidae, and Favidae (Riegl, 1996; Schleyer et al., 1999).

In the Inhambane region, the coral reefs closest to the study area occur on the eastern and southeastern margins of the Bazaruto Archipelago islands, approximately 10 km west of the seismic research area. Fringing reefs are also present on the northeastern margins of Bazaruto Island, where significant hard and soft coral cover is recorded, as well as some formations north of the town of Inhassoro. The Parabolic Dune Coast features submerged rocky reefs, with predominant soft coral species and reef-building hard corals occurring more restrictively, giving the reef formations in this region a subtidal character distinct from the north of the country (Pereira et al., 2014).

Coral reefs are recognised as one of the ecosystems with the highest biodiversity value and greatest economic productivity, providing essential ecosystem services: food for millions of people, coastal protection, habitat and spawning grounds for commercially valuable fish species, and support for diving tourism (UNEP, 2007).

5.3.1.2 Seagrass Meadows

Seagrasses are vascular plants adapted to marine and estuarine environments, playing a crucial role in sub-coastal aquatic ecosystems, occurring in close association with reefs and mangroves (Gullström et al., 2002). They tend to establish themselves in sheltered waters – coves and bays – with suitable substrate (sand/mud), low wave energy, and reduced suspended solids concentrations. They can occur from the intertidal zone down to depths of 40 metres in shallow subtidal conditions, although light limitation restricts their predominant occurrence to depths less than 12 metres.

In Bazaruto Bay, from Inhassoro to Cape São Sebastião, seagrass meadows cover an estimated area of 88 km² (Bandeira et al., 2008; Findlay et al., 2011). Eight species were recorded in this area: *Thalassia hemprichii*, *Thalassodendron ciliatum*, *Cymodocea rotundata*, *Cymodocea serrulata*, *Halophila ovalis*, *Zostera capensis*, *Halodule uninervis* and *Syringodium isoetifolium* (Bandeira *et al*., 2008; Findlay *et al*., 2011). The species *Thalassodendron ciliatum* is dominant in mono-specific meadows; in mixed meadows, *Thalassia hemprichii*, *Halodule wrightii* and various macroalgae also occur. Zostera capensis is classified as Vulnerable by the IUCN Red List (IUCN, 2024); the remaining species are classified as Least Concern.

The ecosystem functions of meadows include nursery areas, foraging and refuge sites for marine animal groups, turbidity reduction through sediment stabilisation, and support for ecosystem productivity by capturing nutrients and carbon (Gullström et al., 2002). Seagrasses are the preferred feeding habitat for the dugong (Dugong dugon) and the green turtle (Chelonia mydas), both threatened species (VerdeAzul Consult, 2015). The main threats to the integrity of the meadows are anthropogenic, namely damage from seine net trawling and trampling during invertebrate collection in shallow subtidal areas (Stiefel, 2005).

5.3.1.3 Mangroves

Mangroves are intertidal coastal ecosystems dominated by halophytic trees and shrubs adapted to variable salinity conditions, muddy substrate, and periodic tidal inundation. They constitute one of the most productive and ecologically relevant ecosystems in tropical and subtropical coastal zones, performing critical functions in coastal protection, biogeochemical regulation, blue carbon sequestration, and supporting fisheries resources.

Mozambique hosts the largest extent of mangroves in Southern Africa and ranks 13th globally in terms of mangrove cover, with a total estimated area between 270,000 and 300,000 ha (Giri et al., 2011; World Bank, 2024). The country represents approximately 60% of the total continental mangroves in East Africa (Spalding et al., 2010), recognising the exceptional value of this resource in the regional context.

Mangroves constitute a type of coastal vegetation found in tropical and subtropical zones, dominated by perennial trees and shrubs that grow in areas subject to tidal influence with high salinity.

Along the Mozambican coast, eight representative species occur: *Avicennia marina, Rhizophora mucronata, Bruguiera gymnorhiza, Bruguiera cylindrica, Xylocarpus granatum, Sonneratia alba, Heritiera littoralis, Ceriops tagal and Lumnitzera racemosa* (Marzoli, 2007; Wilkie, 2005). All species are classified as Least Concern by the IUCN, although with a decreasing trend in their populations (IUCN, 2024).

In the study area region, the main mangrove stands occur to the north, in the Save River Delta, and in more dispersed formations on the islands of Bazaruto, Benguerra and Santa Carolina (Dutton and Drummond, 2008), as well as on the mainland, in Vilanculos Bay and south of Inhassoro.

Mangroves are highly productive ecosystems and provide critical ecosystem services: coastal protection against erosion, sediment stabilisation, nutrient capture, support for reef and seagrass productivity through organic matter transfer, nursery and breeding habitat for commercially valuable fish and crustacean species, and a subsistence resource for local communities. In areas close to population centres, mangroves have been subjected to significant anthropogenic pressure, due to cutting for construction, firewood and charcoal production.

5.3.1.4 Open Ocean Pelagic Ecosystem

The open-sea pelagic ecosystem corresponds to the oceanic water column and pelagic water masses situated beyond the direct influence of the seabed and the shallow coastal zone. From an ecological perspective, this ecosystem encompasses the entire water column, from the surface euphotic zone to the deep bathyal layers, constituting the largest biome in the biosphere. Functionally, the pelagic ecosystem sustains the entire marine food web — from phytoplankton to apex predators — and plays a decisive role in global biogeochemical regulation, carbon sequestration, and the support of oceanic fisheries.

In the south-central zone of Mozambique, the open-sea pelagic ecosystem is intimately linked to the oceanographic dynamics of the Mozambique Channel, whose mesoscale characteristics, thermohaline gradients, and seasonal regimes directly condition the productivity, species distribution, and trophic interactions of the pelagic system. The Mozambique Channel is recognised as a marine biodiversity hotspot in the Western Indian Ocean, with particular relevance for cetaceans (at least 22 documented species), pelagic elasmobranchs, sea turtles, whale sharks, and deep-sea rays (African Aquatic Conservation, 2017; SIBMOZ, 2024).

The pelagic ecosystem is organised into vertical layers defined by the availability of light, temperature, and hydrostatic pressure. In the study area, depths vary between approximately 200 m and 1,800 m, corresponding to the mesopelagic and bathyal zones:

Table 5-3: Pelagic zones, indicative depths, and main ecological characteristics of the water column

Zone	Depth	Ecological Characteristics
Epipelagic	0–200 m	Euphotic zone; active photosynthesis; plankton, pelagic fish, large predators
Mesopelagic	200–1,000 m	Dim light to absent; intense diurnal vertical migration; diverse mesopelagic fauna
Bathyal	1,000–4,000 m	Total darkness; high pressure; specialised deep-sea fauna

Zone	Depth	Ecological Characteristics
Abyssal	> 4,000 m	Absent in the project area; maximum depths of the Channel are ~5,000 m in the North and South basins

5.3.1.5 Relevance Synthesis of Habitats South-Central Zone

Mozambique's marine habitats exhibit high diversity and ecological importance, but the south-central region stands out for its combination of deltaic systems, mangroves, sedimentary banks, estuaries, swamps, barrier islands, seagrass meadows, rocky reefs, nesting beaches, open sea, and offshore bottoms. This region functions as an interface between the central swampy coast and the southern parabolic dune coast, integrating areas of high fishing productivity, habitats for threatened species, protected areas, and important ecosystem services.

For an offshore seismic acquisition project, most sensitive coastal habitats — mangroves, seagrasses, reefs, beaches, and swamps — tend to be located outside the direct acquisition area when it takes place in deep waters. However, these habitats remain relevant for defining the indirect influence area, assessing cumulative impacts, planning support routes, managing accidental risks, protecting marine megafauna, and framing regional ecological sensitivity.

Table 5-4: Synthesis of relevance by habitat type

Habitat	Distribution and importance in the south-central	Main ecological functions	Relevance for offshore projects
Mangroves	More extensive on the central coast; important in the Zambezi, Púnguè, Save and protected/estuarine areas of Inhambane	Nursery for fish and crustaceans, sediment retention, coastal protection, blue carbon	Sensitive receptors in accidental scenarios, logistical routes and impacts cumulative
Seagrasses	Very relevant in Bazaruto, Vilankulo, Inhassoro and São Sebastião	Food source for dugongs and turtles, fish nursery, sediment stabilisation	Indirect critical receptor; sensitive to pollution, turbidity and shallow water traffic
Coral and rocky reefs	More limited in the centre; relevant in Bazaruto, Tofo, Barra and subtropical rocky formations	Habitat for fish, invertebrates, tourism, coastal protection	Sensitive to spills, turbidity, physical damage and coastal cumulativity
Estuaries, deltas and swamps	Dominant on the Marshy Coast, especially Zambezi, Púnguè, Save and Sofala	High productivity, shrimp fishing, water birds, fine sediments	Important for cumulative assessment, fishing and accidental scenarios
Beaches, dunes and barrier islands	Bazaruto and the south coast of Inhambane	Turtle nesting, coastal protection, tourism	Sensitive to coastal logistics, light, waste and extreme events
Open sea/pelagic	Mozambique Channel, deep offshore waters	Routes for cetaceans, turtles, pelagic fish, seabirds	Direct operational habitat; relevant for underwater noise, collisions and navigation
Offshore benthic substrates	Sandy, muddy and sandy-muddy bottoms	Benthic communities, biogeochemical cycles, demersal trophic base	Data gaps; relevant if there is contact with the seabed or pollution risks

5.3.2 Marine Mammals

5.3.2.1 Regional Ecological Framework

South-central Mozambique is part of the Western Indian Ocean and the Mozambique Channel, an oceanographically dynamic region, with a continental shelf, slope, deep waters, islands, sandbanks, reefs, mangroves and seagrass meadows. This diversity of habitats supports different groups of marine mammals, from resident coastal species, such as dolphins and dugongs, to oceanic and deep-diving species, such as sperm whales and beaked whales (Samoilys et al., 2015).

The available specialist literature indicates that the distribution and abundance of marine mammals on the continental shelf and slope of Mozambique are not yet well understood. This uncertainty is consistent with regional literature, which shows that many records in the Mozambique Channel result from localised surveys, opportunistic studies, marine tourism data, vessel observations and extrapolation from similar habitats elsewhere in the Western Indian Ocean (De Boer et al., 2004; Kiszka et al., 2007; Rollinson, 2023).

It should be noted, however, that the coastal area of Mozambique is recognised as relevant for Southern Hemisphere humpback whales, which migrate from feeding grounds at high latitudes to tropical and subtropical breeding waters during the austral winter. The Important Marine Mammal Area fact sheet "Mozambique Coastal Breeding Grounds" identifies the coastal waters between the 20 m and 200 m isobaths as a mating, calving and nursery area between July and November, which confirms the seasonal relevance of the Mozambican continental shelf for the species (Findlay et al., 1994; Best et al., 1998; IUCN-MMPATF, 2025).

5.3.2.2 Mysticetes: baleen whales

The mysticetes potentially relevant to the region include the humpback whale (Megaptera novaeangliae), the minke whale or 'filter whale' as designated in the baseline reports (Balaenoptera acutorostrata), and the southern right whale (Eubalaena australis). Some sources indicate seasonal residence and reproduction between June and November for these species in the study area, with greater relevance for continental shelf waters and coastal proximity.

The humpback whale is the most relevant mysticete species for the assessment, due to the documented use of the Mozambican coast as an area for wintering, reproduction, calving, and calf-rearing. Classic studies on the winter distribution of humpback whales in the southwest Indian Ocean identify the corridor of the East African and Mozambique coast as part of the breeding grounds for the Southern Hemisphere Stock C (Findlay et al., 1994; Best et al., 1998). The baseline reports state that mother-calf pairs were recorded between late October and December and that the proportion of females with calves increases from South to North Mozambique, reinforcing the importance of warm, coastal waters in the reproductive cycle (Guissamulo, 2009).

For an offshore seismic survey, the sensitivity of mysticetes stems primarily from their dependence on low-frequency acoustic signals for communication and social behaviour, and the possible overlap between operational periods and the migratory/reproductive season. Although reproduction tends to concentrate on the continental shelf and in coastal waters, migration may involve crossing deeper waters (Nowacek et al., 2007; Southall et al., 2019; CBD, 2022).

5.3.2.3 Oceanic and deep-diving odontocetes

Potential odontocetes include the sperm whale (Physeter macrocephalus), pilot whales, beaked whales, Risso's dolphin, false killer whale, melon-headed whale, spotted dolphin, striped dolphin, and spinner dolphin. P17 species of odontocetes may occur in the Mozambique Channel, with 12 species reliably

recorded in the study area based on Peddemors et al. (1997), De Boer et al. (2003/2004), Kiszka et al. (2009), and IUCN (2024).

The sperm whale is particularly relevant in an offshore context due to its occupation of deep waters, use of echolocation, and prolonged dives for feeding on cephalopods. The odontocetes such as sperm whales, beaked whales, and pilot whales may utilise the continental shelf, slope, and abyssal zones between 200 m and 2,000 m, feeding mainly on large mesopelagic cephalopods and undertaking long-duration dives (Whitehead & Weilgart, 2000).

The potential presence of deep-diving species increases the relevance of Passive Acoustic Monitoring (PAM), especially in waters deeper than 200 m, at night, in low visibility, or when visual observation by Marine Mammal Observers (MMO) does not ensure adequate coverage.

5.3.2.4 Coastal and resident dolphins

Coastal and resident dolphins include the common bottlenose dolphin (*Tursiops truncatus*), the Indian humpback dolphin (*Sousa plumbea*), the spinner dolphin (*Stenella longirostris*), and the common dolphin (*Delphinus delphis*), among other species. These species occur between the islands of the Bazaruto Archipelago and the mainland, while more oceanic species, such as the striped dolphin and Fraser's dolphin, may occasionally approach the coastal region (Rollinson, 2023).

The Indian humpback dolphin is a coastal species of high conservation concern. The IUCN Cetacean Specialist Group indicates that *Sousa plumbea* is assessed as Endangered on the Red List, reflecting its vulnerability to coastal pressures, including bycatch, habitat degradation, disturbance, and shipping traffic (IUCN-CSG, 2024).

For a seismic survey in deep waters, the direct risk to this species should be lower than for oceanic species if the acquisition remains away from coastal areas; however, support routes, logistical bases, vessel traffic, and coastal incidents must be assessed in the EIA (JNCC, 2017; IOGP/IAGC, 2017).

5.3.3 Dugong

Taxonomic Framework and Conservation Status

The dugong (Dugong dugon Müller, 1776) is the sole living representative of the family Dugongidae, belonging to the order Sirenia. It is a herbivorous marine mammal, strictly dependent on seagrass meadows in tropical and subtropical coastal waters of the Western Indo-Pacific, between approximately 27° N and 27° S.

The East African subpopulation was reclassified by the IUCN in 2022 as Critically Endangered (CR C2a[ii]), based on the following criteria: estimated number of mature individuals less than 250 along the entire East African coast; concentration of over 90% of the subpopulation in a single locality; and a documented continuous decline trend from participatory surveys conducted over the last three decades (Trotzuk et al., 2022a). The global scale maintains the classification of Vulnerable (Marsh & Sobtzick, 2019).

In Mozambique, the dugong benefits from legal protection under national fisheries and wildlife conservation legislation, and internationally through the Convention on Migratory Species (CMS) and its Memorandum of Understanding on Dugongs, the Convention on International Trade in Endangered Species (CITES), and the Convention on Biological Diversity (CBD) (Muir & Kiszka, 2012; Cockcroft et al., 2018).

Distribution and Occurrence in Mozambique

Historically, dugongs were distributed along the entire Mozambican coast, with documented records in Maputo Bay, Inhambane Bay, Bazaruto Archipelago, Primeiras and Segundas (Angoche), and Quirimbas Archipelago (Hughes & Oxley-Oxland, 1971; Cockcroft et al., 1994; Findlay et al., 2011). A 1969 survey, based

on local fishermen's reports, concluded that dugongs were relatively common along the entire coast (Hughes, 1969).

Currently, the situation is radically different. Dugong sightings and strandings are extremely rare outside the Bazaruto Seascape (approximately 21° S to 22° S) (Cockcroft et al., 2018; Trotzuk et al., 2022a). This area constitutes the only location in East Africa where a globally significant dugong population is known, and it has been internationally recognised as an Important Marine Mammal Area (IMMA) and a Key Biodiversity Area (KBA) (IUCN-MMPATF, 2021; Key Biodiversity Areas Partnership, 2024).

The Inhambane Region in the Context of Distribution

The Inhambane region — including Inhambane Bay and the coastal corridor between Morrumbene and Cabo da Barra — is part of the documented historical distribution area of dugongs (Hughes & Oxley-Oxland, 1971). This zone is explicitly identified in the most recent global report on the status of dugongs (Marsh et al., 2024 — Chapter 2: East Africa) as an area of potential local importance, under the designation: "Morrumbene southwards through Inhambane Bay to Cabo da Barra", included in the list of confirmed and possible areas of local importance in Mozambique.

The Bazaruto Archipelago, located north of Vilanculos, is the core of this subpopulation. Dugongs are usually observed in shallow coastal waters, in sheltered areas such as Bazaruto Bay, in mangrove estuaries, and on sandy plains sometimes covered with macroalgae, almost always in waters less than 20 m deep and less than 10 km from the coast (Trotzuk et al., 2022b). Individuals and calves have occasionally been detected more than 20 km away or in depths greater than 30 m, which should not be excluded from assessment scenarios.

Dugong population decline results from multiple pressures, including accidental bycatch in nets, poaching, seagrass habitat degradation, aquatic pollution, anthropogenic disturbances (namely from recreational and tourism activities), and extreme weather events.

Dugongs are legally protected in Mozambique under Article 31 and Annex VIII of Decree No. 82/2021, of 15 October (Regulation of Recreational and Sport Fishing). Although they are generally infrequent in deep oceanic waters, they may occasionally occur in these areas during migrations between feeding habitats.

Ecology and Habitat: The Role of Seagrass

The dugong inhabits seagrass communities, depending on them as a primary food source (Marsh et al., 2018). The distribution of dugongs is, to a large extent, determined by the availability and quality of seagrass meadows.

In Bazaruto Bay, ten species of seagrass have been identified, with shallow meadows covering approximately 90 km^2 (Everett & Van der Elst, 2008; K. Allen, pers. comm., 2022). Seagrass cover north of Bazaruto Bay, although existing, has not yet been quantified in terms of extent and specific composition.

The tidal regime of the Bazaruto Seascape — a mixed semi-diurnal, with spring tide amplitudes exceeding 5 m — influences foraging behaviour: animals forage in shallow coastal areas during high tide and move to deeper bottoms or channels during low tide (Trotzuk et al., 2022b; Sumich, 1996). This tidal dynamic is directly relevant to assessing the risk of overlap with sources of acoustic disturbance.

Mozambique possesses one of the largest national seagrass extents in East Africa, estimated at 1,779 km^2 (Traganos et al., 2022), which forms the support base of the available habitat for this species.

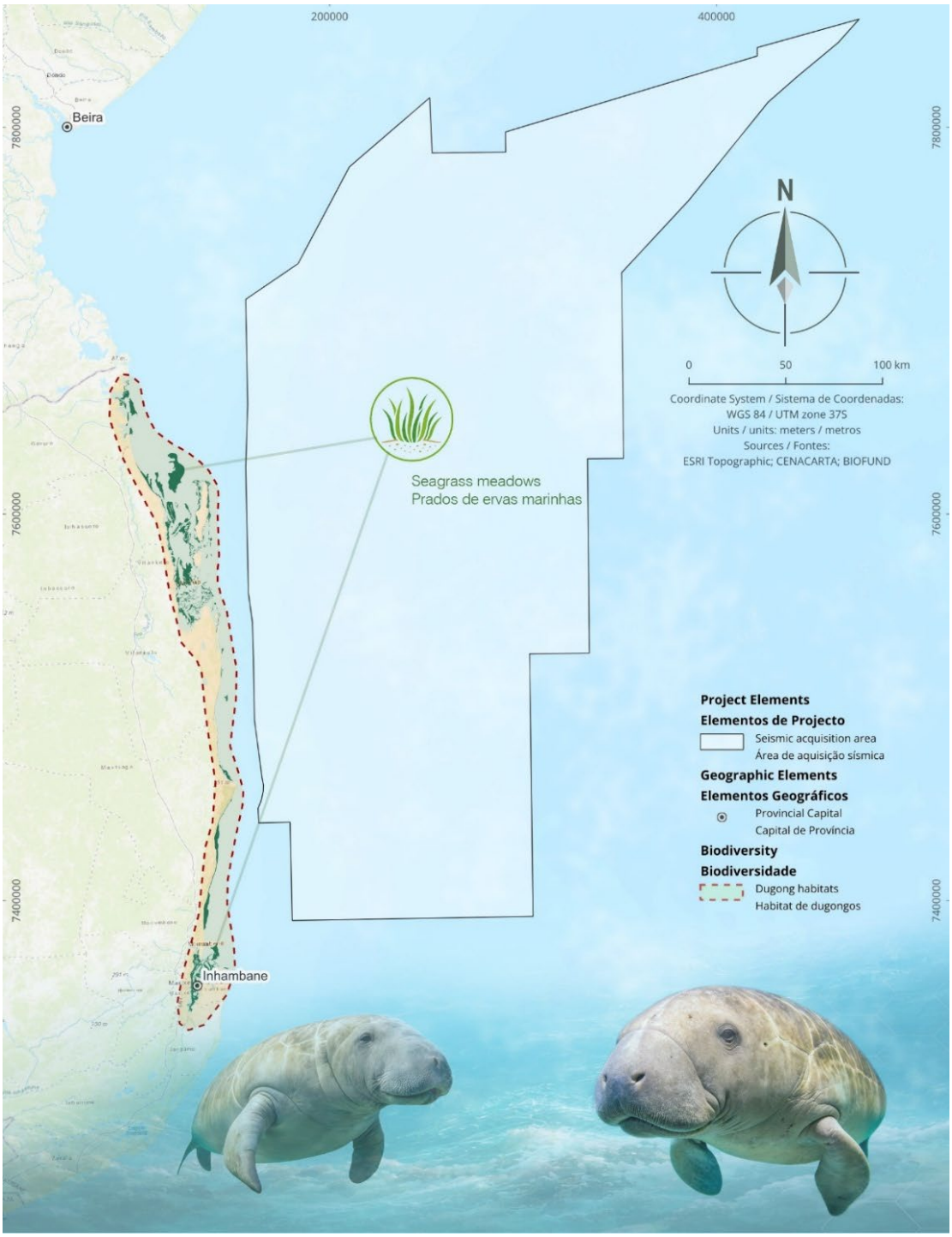


Figure 5-5: Dugong Habitat relative to acquisition areas seismic (Marche et al., 2024).

Identified Threats

The main threats to dugongs in the Bazaruto Seascape and Inhambane region, systematised based on the most recent assessments (Trotzuk et al., 2022a; Marsh et al., 2024), are as follows:

- Incidental capture in fishing gear, namely gill nets and seine nets; illegal, unreported, and unregulated (IUU) fishing represents an additional risk, particularly when incidental catches are retained for consumption.
- Collisions with vessels, a risk potentially increasing with the rise in tourism and fishing activities.
- Extreme weather events, including storm surges and cyclones

5.3.4 Marine Turtles

Marine turtles constitute a group of high ecological and conservation relevance in the context of the Mozambique Channel and the central-south coast of Mozambique. Their inclusion as a sensitive ecological receptor is justified for three main reasons: i) proven or probable occurrence of several species along the Mozambican coast; ii) use of coastal and marine habitats for nesting, feeding, development, and migration; and iii) vulnerability to anthropogenic pressures, including accidental capture in fisheries, degradation of coastal habitats, pollution, collisions with vessels, underwater noise disturbance, and interaction with maritime equipment.

Five of the eight marine turtle species existing in the world occur in the Indian Ocean and nest on Mozambican beaches (Table 5-5). All species present in the region are under international (CITES) and national protection, and classified into different threat categories by the IUCN Red List (2024). The statuses are based on the synthesis of the IUCN-SSC Marine Turtle Specialist Group.

Table 5-5: Marine turtle species present in the Mozambique Channel

Common Name	Scientific Name	IUCN Status (2024)	Observations
Green Turtle	*Chelonia mydas*	Globally Least Concern since 2025; Southwest Indian Ocean subpopulation listed as Least Concern	Primarily associated with seagrass meadows, shallow coastal areas, sheltered bays, and reef areas; may occur in offshore waters during movements between feeding, growing, and nesting areas.
Hawksbill Turtle / / Hawksbill	*Eretmochelys imbricata*	Critically Endangered	Associated with reef habitats and coastal zones; offshore occurrence possible during movements.
Leatherback Turtle / / Giant	*Dermochelys coriacea*	Globally Vulnerable; Southwest Indian Ocean subpopulation Critically Endangered	Highly migratory species, with oceanic occurrence and particular relevance for assessing offshore routes.
Loggerhead Turtle	*Caretta caretta*	Vulnerable; Southwest Indian Ocean subpopulation listed as Near Threatened	Species associated with nesting areas in southern and south-central Mozambique; may occur during oceanic migration.
Olive Ridley Turtle	*Lepidochelys olivacea*	Vulnerable	Occurs in Mozambican waters; regional information on offshore area use and regular nesting is limited.

The spatial distribution of species along the Mozambican coast follows a latitudinal pattern: green, hawksbill, and olive ridley turtles are predominantly concentrated north of the Save River, while loggerhead and leatherback turtles occur more frequently south of this river. Marine turtles are species with a great capacity for dispersal and can cross deep oceanic areas, potentially using the seismic acquisition zone as a migratory corridor (Figure 5-6).

Marine turtles have long life cycles, late sexual maturity, high fidelity to nesting areas, and in many cases, fidelity to feeding areas and migratory corridors. These biological attributes make populations sensitive to increases in adult and subadult mortality, as well as to the degradation of critical nesting and feeding habitats. However, regional literature confirms that important gaps persist regarding migratory routes and feeding areas for several species in the Southwest Indian Ocean, including the hawksbill turtle and the olive ridley turtle.

Marine turtles are also subject to multiple anthropogenic pressures. Costa et al. identify threats in Mozambique as loss and degradation of nesting and feeding habitats, hunting for meat and shells, egg collection, and accidental capture in fisheries.

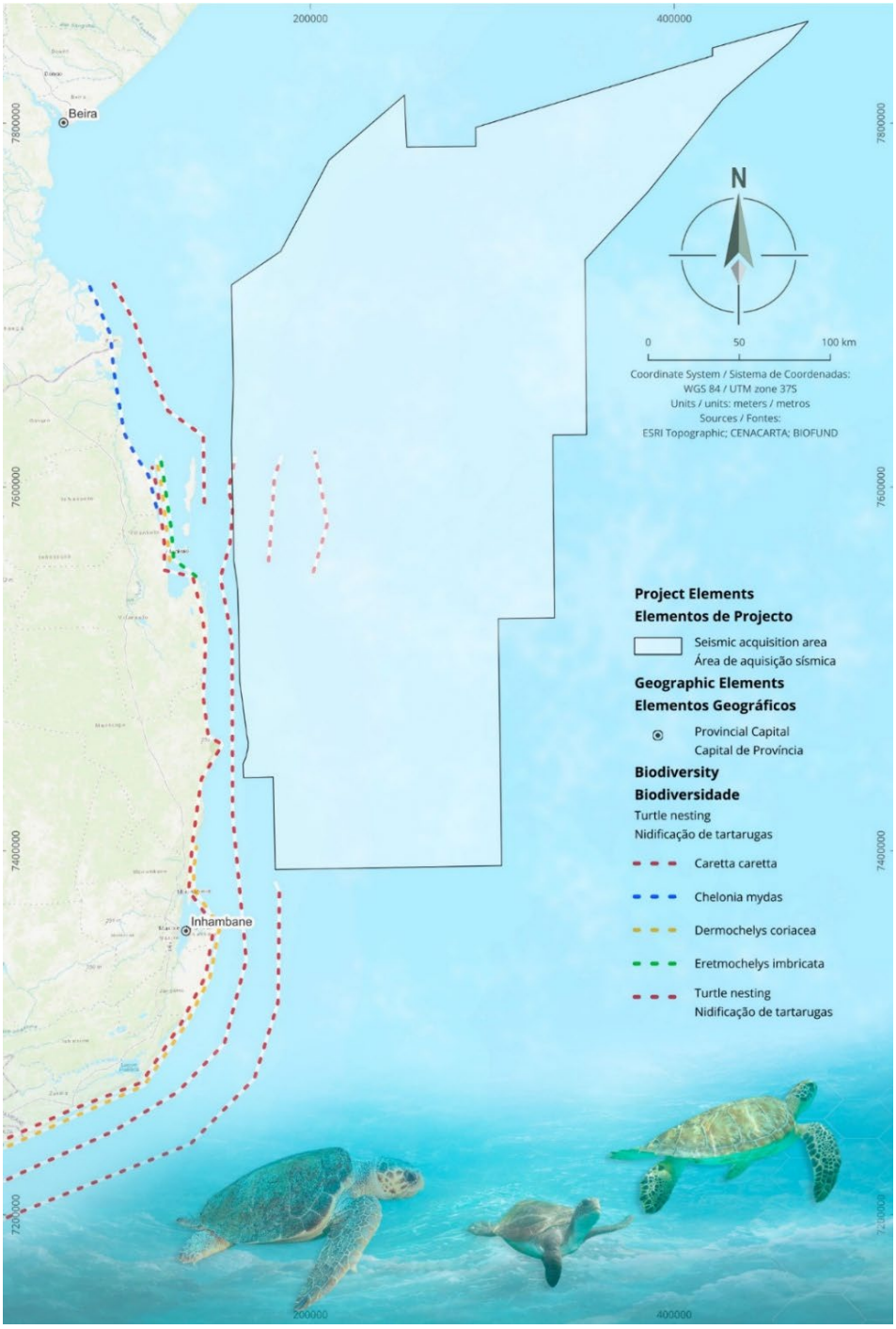


Figure 5-6: Marine turtle species most likely to occur in the seismic acquisition area

5.3.5 Pelagic Species

The waters of the region constitute an important migratory route for various species of pelagic fish of high ecological and commercial value. Among these, the bonito (*Euthynnus affinis*), the sailfish (*Istiophorus platypterus*), the black marlin (*Makaira indica*), the swordfish (*Xiphias gladius*), the dolphinfish (*Coryphaena hippurus*), and the wahoo (*Acanthocybium solandri*).

Whale sharks (*Rhincodon typus*) and manta rays (*Mobula birostris*) are planktivorous migratory species that frequent the region's surface waters. Their movement pattern is closely linked to the distribution of planktonic blooms, and they are capable of crossing deep-water habitats in search of areas with high plankton concentrations.

5.3.6 Species with potential occurrence and relevance for the EIA

A Figure 5-6 consolidates the most relevant species indicated in the baseline reports and regional literature. The list should be considered a preliminary list of potential occurrence, not a confirmation of permanent presence in all offshore sectors. Conservation statuses should be confirmed in the EIA based on the current version of the IUCN Red List, CITES, CMS, and updated taxonomic databases, such as WoRMS, due to taxonomic changes and periodic status reviews (IUCN, 2022; IUCN-CSG, 2024).

Table 5-6: Species relevant for central-southern Mozambique and their preliminary importance for o project of acquisition seismic offshore

Group / species	Scientific name	Occurrence / indicative habitat	Period / status referred	Relevance for offshore seismic
Humpback whale	Megaptera novaeangliae	Continental shelf, coastal waters and slope; migration may involve deep waters.	June-November; coastal breeding area between July-November according to IMMA.	High seasonal sensitivity; priority for acoustic modelling, scheduling, MMO/PAM and soft-start.
Minke whale / "filter feeder whale"	Balaenoptera acutorostrata	Potential mysticete on the shelf and offshore waters.	June-November	Low-frequency receiver; sensitivity to impulsive noise and potential masking.
Southern right whale	Eubalaena australis	Regular/occasional occurrence along the coast; reproductive use possible but less frequent than humpback whale.	June-November	Relevant due to migratory status and coastal use; assess seasonal presence.
Sperm whale	Physeter macrocephalus	Deep waters, slope and oceanic zones; feeding on cephalopods.	annual occurrence/migratory males; IUCN global Vulnerable.	High relevance for deep waters; PAM recommended due to vocalisation and prolonged dives.
Beaked whales	Ziphiidae spp.	Slope and deep waters; potential occurrence due to habitat.	Insufficient specific data for the area.	Highly priority group for precautionary approach and acoustic monitoring in deep waters.
Short-finned pilot whale	Globicephala macrorhynchus	Oceanic/slope; potentially associated with squid resources.	year-round occurrence; status reported as Data Deficient.	Sensitive to noise and disturbance; relevant for PAM and cumulative exposure assessment.
Risso's dolphin	Grampus griseus	Slope and deep waters.	year-round occurrence	Medium to high relevance in offshore waters; visual/acoustic monitoring.
Melon-headed whale	Peponocephala electra	Pelagic/oceanic.	year-round occurrence	Relevant in deep waters and associated with groups; MMO/PAM.
False killer whale	False Killer Whale	Pelagic/oceanic.	year-round occurrence	Relevant for potential offshore occurrence; monitoring during operation.
Indian humpback dolphin	Plume-backed Dolphin	Coastal, shallow waters, often near bays and estuaries.	IUCN-CSG indicates Endangered	Greater relevance for support routes and coastal zones than for deep-water acquisition.
Common bottlenose dolphin	Common Bottlenose Dolphin	Coastal to neritic; recorded in the Bazaruto region and coastal waters.	year-round occurrence	Relevance for coastal transit, logistical support, and visual monitoring.

Group / species	Scientific name	Occurrence / indicative habitat	Period / status referred	Relevance for offshore seismic
Spinner dolphin	Spinner Dolphin	Coastal/oceanic, with feeding areas in the region; recorded in WIO.	year-round occurrence	May occur in groups; sensitive to disturbance and noise; relevant for MMO/PAM.
Pantropical spotted dolphin	Pantropical Spotted Dolphin	Pelagic, associated with oceanic waters and productivity.	year-round occurrence	Relevant for offshore waters; visually detect during operation.
Striped dolphin	Striped Dolphin	Pelagic/oceanic.	year-round occurrence	Moderate offshore relevance; include in MMO target species list.
Common dolphin	Common Dolphin / Delphinus spp.	Coastal and oceanic;	year-round occurrence	Relevant for monitoring
Dugong	Dugong	Coastal seagrass meadows; Bazaruto, São Sebastião, Save.	East African coastal subpopulation Critically Endangered; Bazaruto regional population estimated at 250–300 individuals.	Low direct exposure in deep waters, but high sensitivity to coastal routes, logistics bases, and accidental spills.
Green turtle	Green Sea Turtle	Seagrasses, shallow coastal areas and reefs; offshore movements possible.	Potential year-round occurrence; globally Least Concern.	Relevant for coastal routes, spills, collision/entanglement and visual MMO.
Hawksbill turtle	Hawksbill Sea Turtle	Reefs, islands and coastal areas; offshore occurrence during movements.	Potential year-round occurrence; Critically Endangered.	Relevance primarily coastal/reef; include in MMO and pollution prevention.
Leatherback turtle	Leatherback Sea Turtle	Pelagic/oceanic; highly migratory.	Migratory occurrence; globally Vulnerable; SWIO subpopulation Critically Endangered.	High offshore relevance; include in MMO, soft-start, collision and entanglement.
Loggerhead turtle	Loggerhead Sea Turtle	Coastal and oceanic; nesting in southern/central-southern Mozambique.	Nesting seasonality to be confirmed; globally Vulnerable.	Moderate to high relevance; consider migration, MMO and collision risk.
Olive ridley turtle	Olive Ridley Sea Turtle	Coastal and pelagic; limited regional information.	Potential occurrence; Vulnerable.	Precautionary relevance; MMO registration and collision/entanglement prevention.

5.4 Protected Areas and Areas of Ecological Relevance

5.4.1 Legal Framework

The legal regime for conservation areas in Mozambique is defined in Law No. 16/2014, of 20 June, as amended and consolidated by Law No. 5/2017, of 11 May (Biodiversity Conservation Law). This diploma establishes two main categories: Total Conservation Areas — which include Integral Nature Reserves, National Parks and Cultural and Natural Monuments, where the extraction of natural resources is not permitted — and Sustainable Use Conservation Areas — which include Special Reserves, Environmental Protection Areas, Official Coutadas, Community Conservation Areas, Sanctuaries, Game Farms and Municipal Ecological Parks, where resource use is permitted under a Management Plan.

5.4.2 Marine Protected Areas

The Marine Protected Areas (MPAs) currently existing in Mozambique cover a total area of approximately 20,462 km², of which about 8,633 km² correspond to marine ecosystems (Table 5-7).

Table 5-7: Existing Marine Protected Areas in Mozambique

Marine Protected Area	Year	Total Area (km²)	Marine Ecosys. (km²)
Quirimbas National Park	2002	7 506	1 430
Primeiras and Secondas Islands APA	2012	10 409	5 000
Cabo de São Sebastião ZPT	2003	439	80
Bazaruto Archipelago National Park	1971/2001	1 430	1 295
Ponta do Ouro Partial Marine Reserve	2009	678	678

5.4.3 Bazaruto Archipelago National Park

The Bazaruto Archipelago National Park (PNAB) is Mozambique's only entirely marine national park, created by Legislative Diploma No. 46/71, of 25 May 1971. In its original configuration, the park covered only the islands of Bengurua, Magaruque and Bangu, plus a 5-nautical-mile surrounding strip, with an area of 600 km². The islands of Bazaruto and Santa Carolina were classified as surveillance areas.

In 2001, by Decree No. 39/2001, of 27 November, the park was expanded to include all five islands, becoming known as the Bazaruto Archipelago National Park, with a total area of 1,583 km². The current boundaries are referenced by the parallels 21°27'30" S and 22°02'55" S and the meridians 35°19'01" E and 35°32'30" E, bordering (Figure 5-7):

- To the south: with Cabo de São Sebastião;
- To the north and east: with the Mozambique Channel / Indian Ocean;
- To the west: with the continental coast of Mozambique.

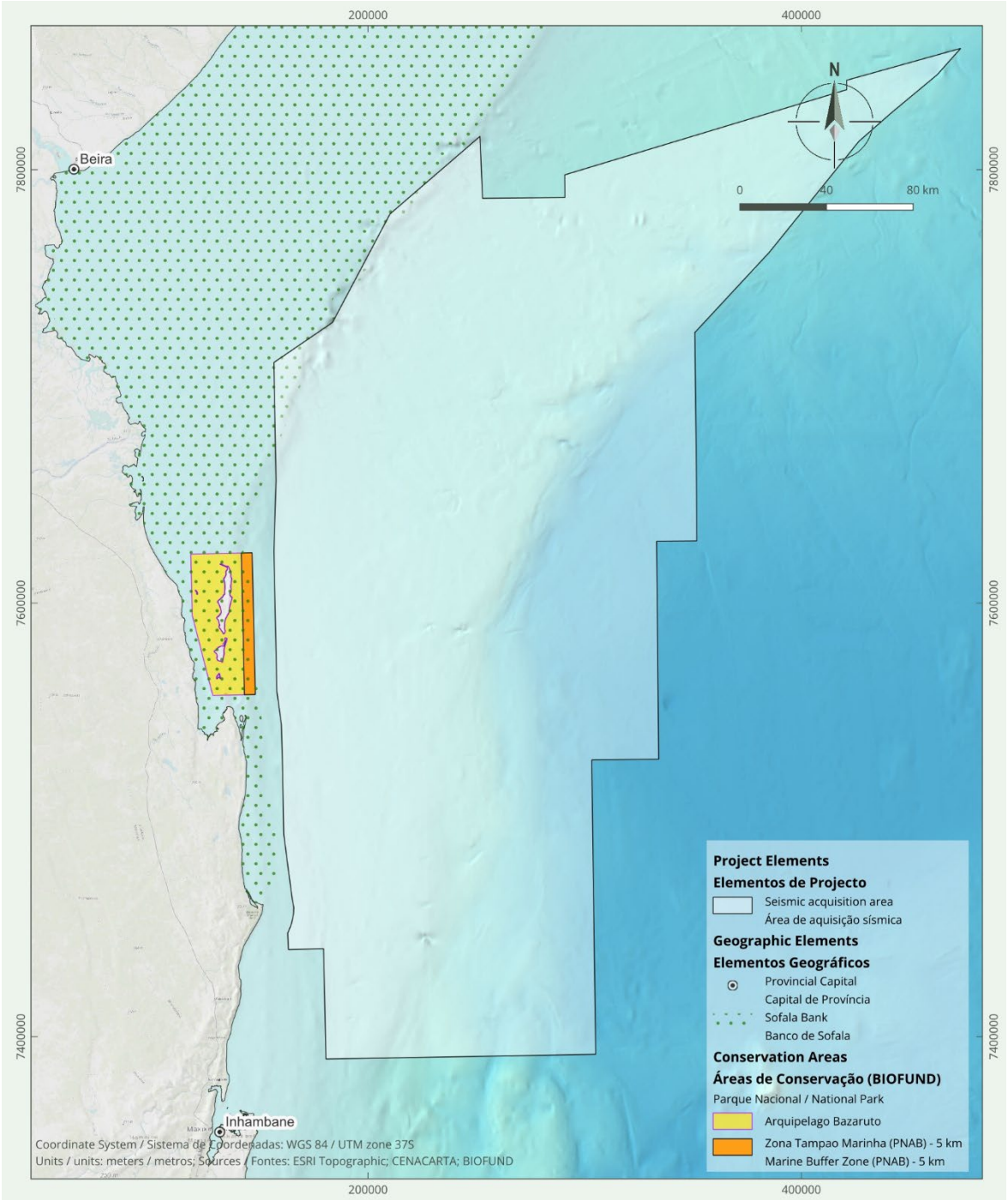


Figure 5-7: Bazaruto Archipelago National Park

The park's primary objective is the conservation of the dugong (Dugong dugon) and marine turtles, having been proposed for this purpose by South African ecologist Ken Tinley in 1969 [Tembe, 2017; PNAB Management Plan, 2016–2025].

The PNAB operates in accordance with o The current Management Plan covers the period 2016–2025 (Díaz et al., 2016), and was developed with funding from the Global Environment Facility (GEF) and supervised by the United Nations Development Programme (UNDP).

Composition and Physical Characteristics

The archipelago is composed of five islands (Table 5-8) which correspond to approximately10% of the total area of the PNAB. The geomorphology of the islands is dominated by Holocene and modern parabolic aeolian dunes on the ocean side, with Pleistocene dune cores exposed on the western side.

Table 5-8: Bazaruto Archipelago Islands

Island	Observations
Bazaruto	Largest island of the archipelago (~12,000 ha); aeolian dunes up to 120 m altitude; freshwater and brackish lagoons of high ecological importance; oceanic beaches for marine turtle nesting; resident communities (~3,400 inhabitants in 2015); main focus of the PNAB's ecotourism activity
Bengurua	Third largest island (~2.500 ha); coastal lagoons with critical wetland ecosystems; marine turtle nesting beaches on the oceanic margin; resident community (~1,500 inhabitants in 2015); congregation area for manta rays (Manta alfredi) in the surrounding waters
Magaruque	Island (~600 ha)with a declining resident community (~188 inhabitants in 2015); relevant for artisanal line fishing; patch reefs in the surrounding waters; seagrass habitats supporting dugongs
Santa Carolina	Formerly designated "Paradise Island"; uninhabited island (~500 ha); ecologically sensitive buffer zone; well-preserved coral reefs and seagrass meadows; area for ecotourism use only
Bangu	Smallest island of the archipelago (~5ha); uninhabited; relevant as a landmark for the southern limits of PNAB; aggregation area for seabirds and migratory marine turtles

The total land area of the five islands is 159.08 km^2 (10% of the total PNAB area). The geomorphology of the islands is dominated by parabolic aeolian dunes of Holocene and modern age on the oceanic margin, with Pleistocene dune cores exposed on the western margin.

The PNAB is divided into management zones with different levels of protection [PNAB Management Plan, 2016–2025]

Table 5-9: PNAB Zoning

Zone	Area (ha)	Description
Marine Total Protection Zones (MTPZ)	1.085	Any extractive or occupation activity prohibited; pedestrian access without motor
Integral Nature Reserve	12.562	Maximum protection; regulated scientific research
Dugong Hotspots	21.374	Critical feeding and distribution areas for dugongs
Marine Turtle Hotspots	23.122	Oceanic nesting beaches and foraging areas
Manta Ray Congregation Site	9.123	Aggregation area for *Manta alfredi* and related species
Zone for Limited Use by Local Communities (ZLULC)	117.100	Reserved for traditional use by island communities; artisanal line fishing
Marine Multiple Use Zone (MMUZ)	25.380	Concessions for tourism and socio-cultural use
Marine Buffer Zone (MBZ)	32.850	5 km strip east of the PNAB limits; surveillance and mitigation of external impacts

The PNAB hosts one of the highest densities of coastal and marine habitats in Mozambique, including coastal dunes, freshwater and brackish lagoons, seagrass meadows, coral reefs (submerged sandstone and fringing), mangroves, and nesting beaches. More than 180 species of birds, 45 species of reptiles, and around 2,000 species of fish are recorded [Everett et al., 2008].

Species of special conservation relevance include [PNAB Management Plan, 2016–2025]:

- Dugong (Dugong dugon): population of approximately 250 individuals — the largest and possibly only viable population in the Western Indian Ocean (WIO), and probably Africa's most threatened mammal;
- 5 species of marine turtles: *Caretta caretta, Chelonia mydas, Dermochelys coriacea, Eretmochelys imbricata, Lepidochelys olivacea*;
- Humpback whale (*Megaptera novaeangliae*): breeding and overwintering area from June to November;
- Whale shark (*Rhincodon typus*) and mantas (*Manta alfredi*): regular aggregations with ecotourism potential;
- Corals: three types of reef — submerged sandstone, submerged fringing, and patch reefs; endemic species *Cladiella kashmani* identified in the archipelago.

The PNAB is currently under increasing pressure from illegal fishing and tourist disturbance, with the main management challenges identified being: the scarcity of patrol means, the growing demographic pressure on inhabited islands (projection of ~6,200 inhabitants for 2025), and the absence of an integrated information management system.

The PNAB Management Plan presents a proposal (Figure 5-8) of reinforcing ecological connectivity and marine protection between SBV, PNAB and adjacent areas, seeking to ensure the continuity of high-value coastal and marine habitats, including sandbanks, channels, seagrass meadows, shallow areas, traditional fishing grounds and habitats used by threatened species.

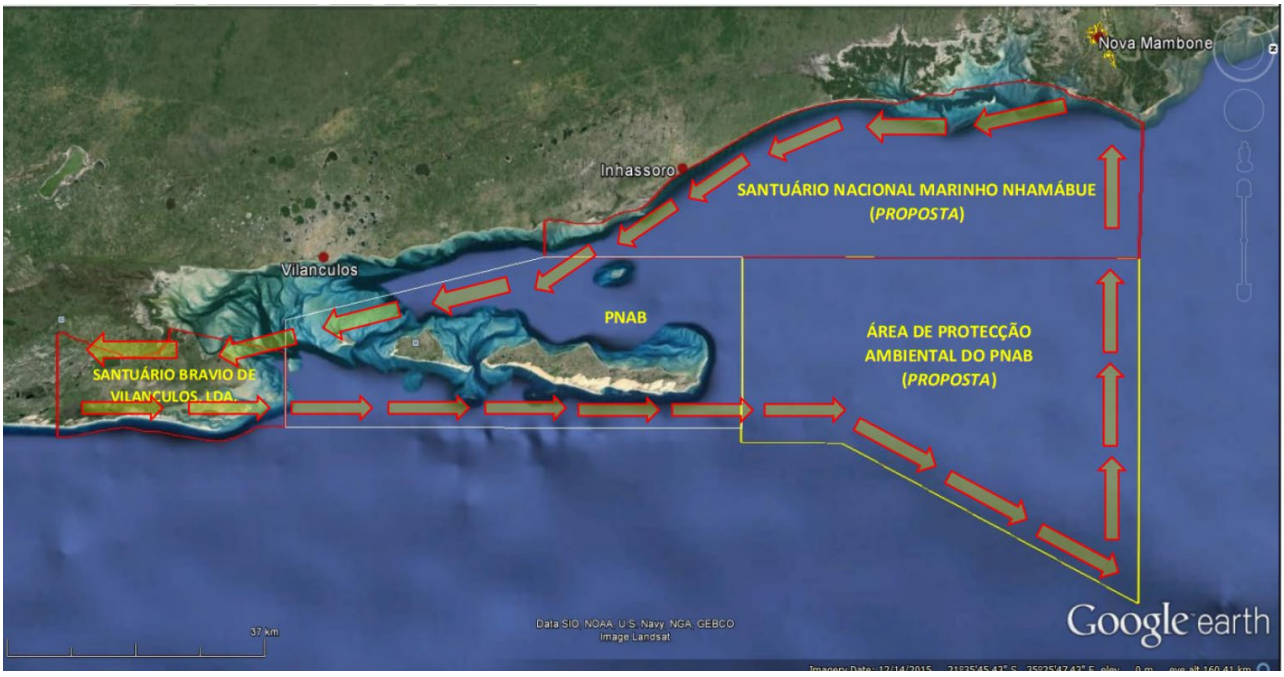


Figure 5-8: PNAB proposal for extension of the area of protection

5.4.4 Zone of Total Protection of Cape São Sebastião

The Total Protection Zone of Cape São Sebastião (Figure 5-9), established by Decree No. 18/2003, of 29 April, covers an area of approximately 439 km² in the São Sebastião Peninsula, in the district of Vilankulo, Inhambane Province. As a 'total protection' area, it benefits from the most restrictive level of legal protection, with any form of human exploitation or interference likely to compromise its natural state being prohibited.

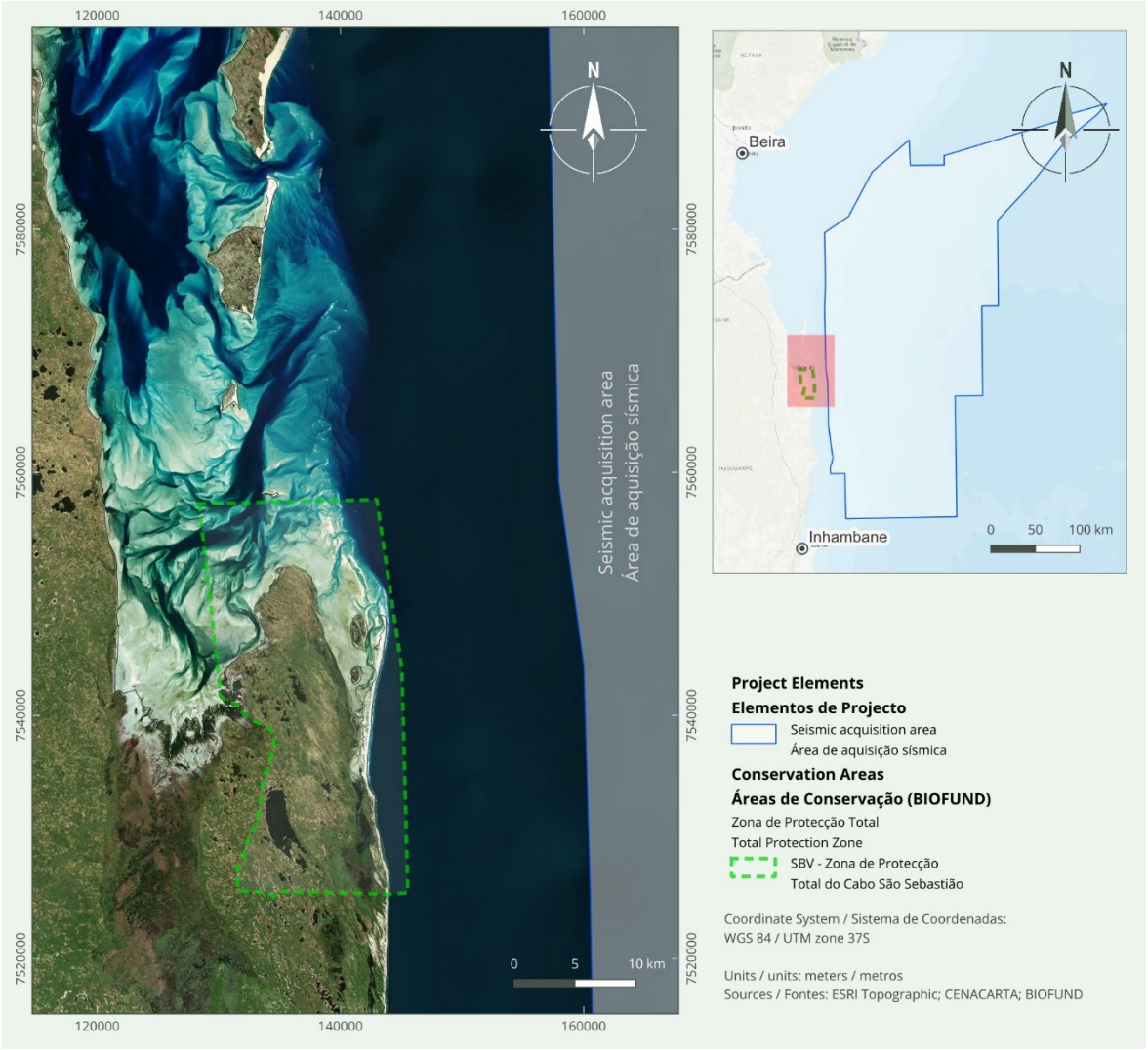


Figure 5-9: Total Protection Zone of Cape São Sebastião

The area includes the São Sebastião Peninsula and the ecological complex associated with the Bazaruto Archipelago. The Vilanculos Bravio Sanctuary Management Plan states that the Sanctuary is located about 18 km southeast of Vilankulo, including most of the Queuene Peninsula, the barrier dune system, and the islands of Linene and Chilondzuene. Access is mainly by boat from Vilankulo or by land from the EN1, highlighting its connection with the coastal and island system of Bazaruto.

From a legal and management perspective, the area was approved by the Council of Ministers through Authorisation No. 4/2000, of 17 October 2000, amended by Internal Resolution No. 2/2003, of 29 April 2003, and is associated with a special licence for nature conservation and low-density tourism. The 2020–2025 Management Plan frames the Sanctuary as an area oriented towards biodiversity conservation, restoration of ecological processes, low-impact tourism, community involvement, and sustainable use of natural resources compatible with its protection objectives.

From an ecological and geomorphological perspective, the São Sebastião Peninsula presents a high diversity of coastal and marine habitats, including coastal dunes, oceanic sandy beaches, cliffs, rocky reefs, tidal flats, sandbanks, channels, sheltered bays, mangroves, seagrass meadows, swamps, freshwater lagoons, and shallow marine areas. The Management Plan identifies as unique, valuable or sensitive habitats: mangrove communities, eastern shore beaches, marine vegetation zones, inlets and bays on the western side of the peninsula, the Vista do Mundo area, the southern tip of the estuary, areas of dead trees used by birds, and inland swamps.

The geomorphological component is particularly relevant. The Management Plan describes the São Sebastião Peninsula and the islands of the Bazaruto Archipelago as recent Quaternary formations, composed essentially of unconsolidated sandy sediments, resulting from the interaction between regional sedimentary input, the Mozambique Current, quaternary sea-level variations, wave action, tides, and wind. The topography is dominated by coastal dunes oriented according to prevailing winds, with altitudes reaching about 128 m above mean sea level, which reinforces the importance of the peninsula as a reference coastal geomorphological unit.

On the reefs and consolidated bottoms adjacent to the peninsula, including the reefs named in local cartography as «San Sebastian Coastal Reserve» (SCR), elasmobranch species of high conservation status are documented, namely broadnose wedgefish (Rhynchobatus australiae) — classified as «Critically Endangered» by the IUCN — bull sharks (Carcharhinus leucas) and tiger sharks (Stegostoma tigrinum), whose habitat utilisation patterns have been monitored through acoustic telemetry within the research programmes of the Marine Megafauna Foundation (MMF), with an acoustic array covering approximately 100 km of coastline in this region, including the waters adjacent to the peninsula.

The eastern beaches of the São Sebastião Peninsula are, therefore, particularly sensitive. The Management Plan states that, between October and March, threatened marine turtles use these beaches for nesting, with confirmed reproduction of loggerhead turtles, leatherback turtles, green turtles, and hawksbill turtles in small but significant numbers. This information reinforces the need to consider the area as a sensitive receptor in the EIA, especially concerning coastal lighting, noise, vessel traffic, pollution, and potential cumulative pressures.

The avifauna is also relevant. The Management Plan refers to 290 recorded bird species and 22 unconfirmed species, totalling a potential count of 312 species for the Sanctuary. The document highlights significant populations of flamingos, crab plovers, Madagascar bee-eaters, and lemon-breasted canaries, as well as the importance of swamps and wetlands for resident, migratory, and wader birds. The southern tip of the estuary and areas of clear water with flamingo concentrations are identified as sensitive areas.

5.4.5 Spatial Relationship with Operational Areas

The seismic acquisition operational area is located off the coast of the Sofala and Inhambane provinces, in the Mozambique Channel. It does not overlap with any formally established conservation area, nor does it intercept the 5 km buffer zone to the West of the PNAB or the ZPT of Cape São Sebastião (Figure 5-10).

It is important to note that, notwithstanding Article 20.4 of Law No. 16/2014 which permits the exploitation of natural resources within protected areas (subject to a master development plan), no project activities are planned within these protected areas. Furthermore, and as discussed above in section 3.1, the seismic survey area was defined to preserve an exclusion buffer of approximately 15 km from the boundaries of these protected areas (see Figure 5-10).

5.4.6 Key Biodiversity Areas

Key Biodiversity Areas (*Key Biodiversity Areas* — KBAs) are sites that contribute significantly to the maintenance of global biodiversity, identified based on internationally recognised scientific criteria. In 2021,

the Ministry of Environment, in partnership with the *Wildlife Conservation Society* (WCS) and with funding from USAID (SPEED+ programme), proceeded to the official identification and mapping of 29 KBAs in Mozambique, of which 25 terrestrial and 4 marine, occupying a total area of approximately 139,947 km^2.

The operational areas do not overlap with any formally delimited KBA, although they are located in the vicinity of the Great Bazaruto KBA, which integrates the Bazaruto Archipelago National Park and the Cape of São Sebastião Total Protection Zone. (Figure 5-10).

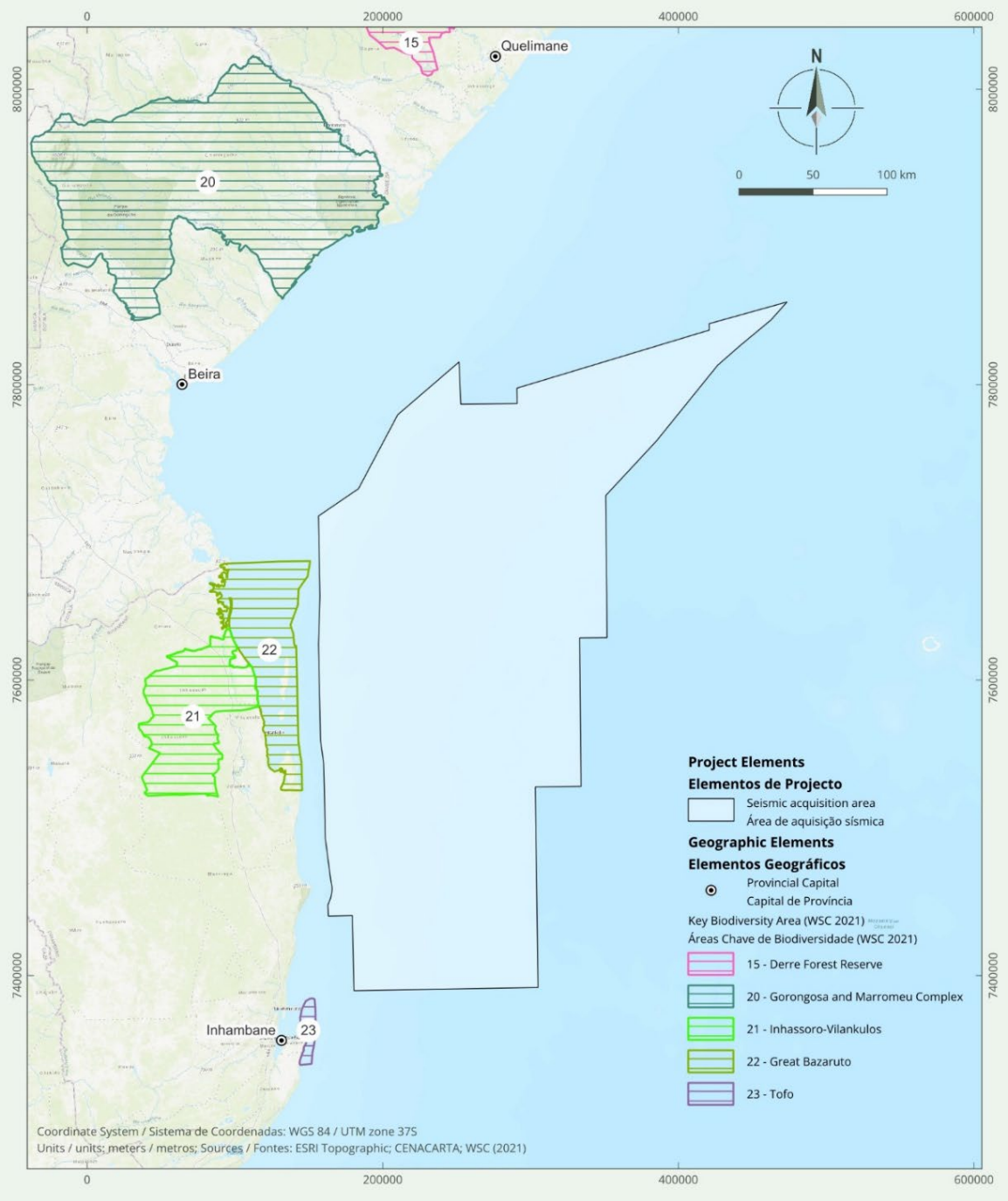


Figure 5-10: Key Biodiversity Areas

5.4.7 East African Marine Ecoregion

The coast of Mozambique is integrated into the East African Marine Ecoregion (EAME), an ecological unit that extends for about 4600 km, covering the territorial waters and EEZs of Somalia, Kenya, Tanzania and

Mozambique down to Sodwana Bay in north-eastern South Africa. The EAME hosts marine biodiversity of global relevance, with over 1500 species of fish, 200 species of corals and 34 species of marine mammals.

As part of the EAME conservation strategy, priority sites for biodiversity conservation have been identified along the entire ecoregion. In the vicinity of the operational areas, two sites of particular relevance stand out: Sofala Bay, classified as of regional importance, and the Bazaruto Archipelago, classified as of global importance. (Figure 5-11).

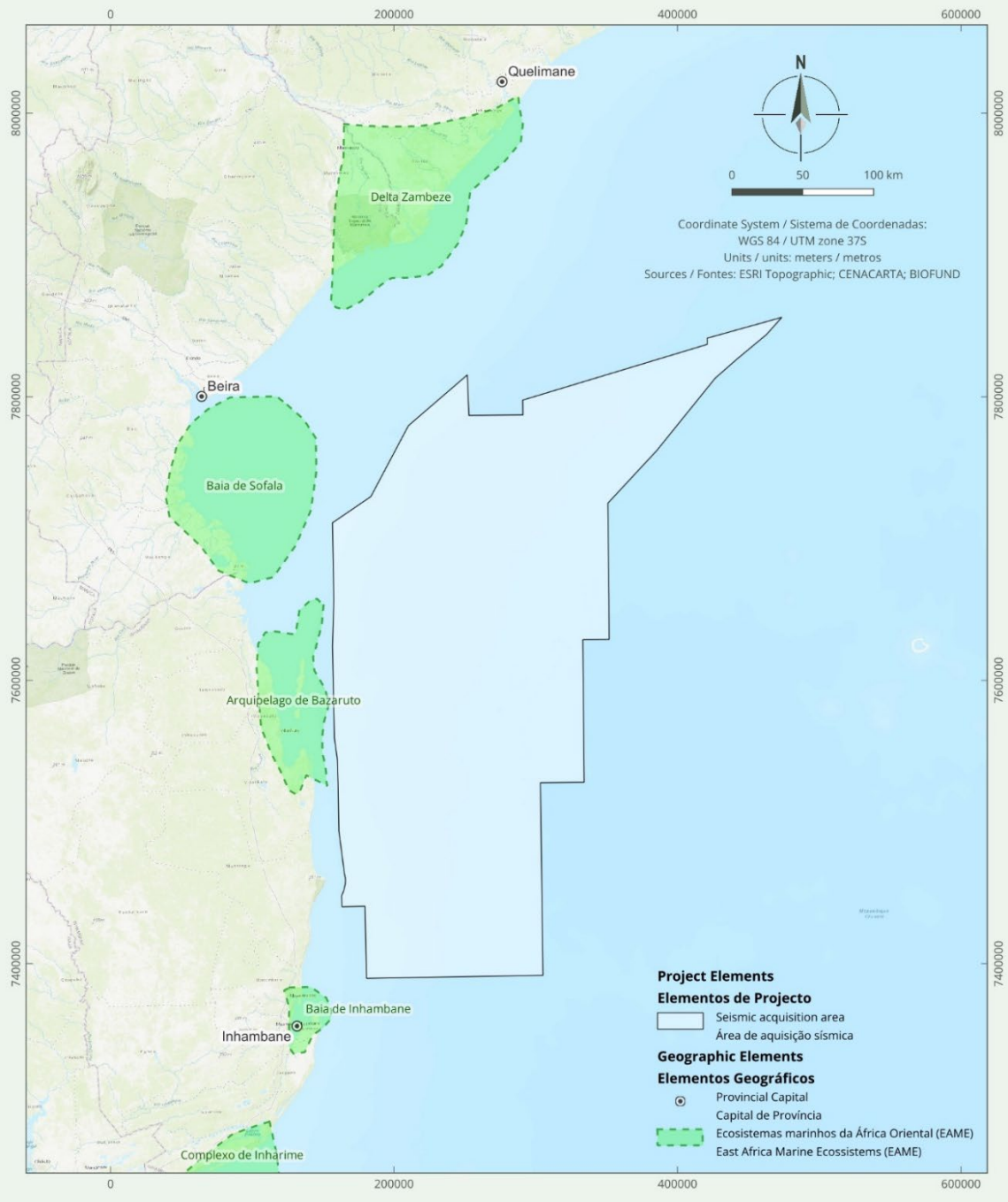


Figure 5-11: Key EAME sites for biodiversity conservation

Within the framework of international best practices, any offshore project in Ecoregion 4 must consider alignment with the EAME conservation objectives and the commitments made by Mozambique under the Convention on Biological Diversity (CBD), the Convention on International Trade in Endangered Species (CITES) and the Convention on Migratory Species (CMS).

5.4.8 Ecosystem Services

5.4.8.1 Framework

Ecosystem services correspond to the benefits that natural ecosystems provide to human populations, directly or indirectly, including food, biological resources, coastal protection, climate regulation, habitat maintenance, fisheries support, tourism, cultural values and essential ecological functions. In the context of the present EPDA, the analysis of ecosystem services is particularly relevant because the seismic acquisition area is located offshore, but in a region functionally linked to coastal and marine habitats of high ecological and socio-economic value, namely coral reefs, mangroves, seagrass meadows, beaches, sandy bottoms, intertidal zones and open sea.

The approach adopted at this stage is qualitative and preliminary, suitable for the level of detail of the EPDA. The objective is not to carry out an economic valuation of ecosystem services, but rather to identify the services potentially relevant to the Project, the habitats that support them, their relative importance and how they may be considered in the subsequent EIA phase.

Although the seismic acquisition area does not directly overlap with the main sensitive coastal habitats, such as mangroves, coastal reefs, nesting beaches and seagrass meadows, these habitats are part of the regional ecological influence area and support relevant human activities, particularly artisanal fishing, coastal tourism and marine megafauna conservation. For this reason, their importance must be considered in the assessment of indirect cumulative and accidental impacts.

5.4.8.2 Categories of ecosystem services considered

For the purposes of this EPDA, ecosystem services have been grouped into four main categories:

- Provisioning services, associated with the direct supply of goods used by communities and economic sectors, such as fish, shellfish, biological resources and biotic raw materials.
- Regulation services, associated with the physical, chemical, and biological functioning of ecosystems, including coastal protection, sediment retention, water purification, climate regulation, and carbon sequestration.
- Support services, which sustain essential ecological processes, such as breeding habitat, nursery grounds, feeding, migration, ecological connectivity, and maintenance of genetic heritage.
- Cultural services, associated with recreation, tourism, landscape values, spiritual values, local identity, and cultural importance of coastal and marine environments.

5.4.8.3 Relative importance of services by habitat

A Figure 5-12 presents a qualitative synthesis of the relative importance of the main ecosystem services associated with four major types of marine and coastal habitat relevant to south-central Mozambique: coral reefs, mangroves, seagrass meadows, and open sea.

Ecosystem Service	Coral Reefs	Mangroves	Seagrass Beds	Open Ocean
Provisioning				
Food supply (fish and seafood)	●●	●●	●●	●●
Biotic raw materials	●	●●	●	○
Regulating				
Climate regulation / carbon sequestration	●	●●	●●	●●
Coastal protection	●●	●●	●	○
Water purification	●	●●	●●	○
Supporting				
Habitat for reproduction, nursery and migration	●●	●●	●●	●●
Protection of genetic diversity	●●	●●	●●	●●
Cultural				
Recreation and tourism	●●	●	●●	●●
Spiritual and cultural values	●	●	●	●

Legend: ●● Very important; ● Somewhat important; ○ Residual.

Figure 5-12: Relative importance of ecosystem services associated with major marine and coastal habitats

The matrix shows that mangroves and seagrass meadows are particularly important for regulation and support services, namely carbon sequestration, water purification, coastal protection, species nursery grounds, and biodiversity maintenance. Coral reefs stand out for their role in supporting biodiversity, coastal protection, fishing, tourism, and cultural values. The open sea, although less relevant for some coastal regulation services, is very important for fishing, pelagic habitat, migratory routes, maintenance of genetic heritage, and the occurrence of marine megafauna.

Ecosystem Services	Description
Provisioning services	The most relevant provisioning services in the region are associated with the supply of fish, shellfish, and other biological resources. These services support artisanal, semi-industrial fishing, and in some areas, commercial activities associated with the fish value chain. Coral reefs, mangroves, and seagrass meadows function as feeding, shelter, and breeding habitats for various species of fish and invertebrates. Mangroves and seagrass meadows are particularly important as nursery areas, supporting juvenile stages of species that may subsequently migrate to coastal, reef, or pelagic habitats. The open sea, in turn, supports pelagic resources and migratory species of fishing importance.
Regulation services	Regulation services are particularly important in shallow coastal habitats. Mangroves contribute to coastal protection, sediment retention, bank stabilisation, nutrient and contaminant filtration, carbon storage, and reduction of wave and storm energy. Seagrass meadows contribute to sediment stabilisation, water quality improvement, carbon sequestration, and maintenance of water column transparency. Coral reefs contribute to wave energy dissipation, coastal protection, and maintenance of the physical structure of marine habitats. The open sea has less direct relevance for coastal protection and local water purification, but it plays important climate and biogeochemical regulation functions on a regional scale, including carbon storage in the oceanic system and support for pelagic productivity.

Ecosystem Services	Description
Support services	Support services are essential for the ecological functioning of the region. Mangroves, seagrass meadows, and coral reefs function as breeding, nursery, feeding, and shelter habitats for various species of fish, crustaceans, molluscs, sea turtles, dugongs, and other species of ecological and economic interest. Seagrass meadows are of particular relevance to dugongs and some sea turtles, serving as feeding areas. Coral reefs and rocky reefs support fish and invertebrate communities, while mangroves and intertidal zones ensure connectivity between terrestrial, estuarine, and marine environments. The open sea constitutes a habitat for passage, feeding, and migration for cetaceans, sea turtles, large pelagic fish, sharks, rays, and seabirds.
Cultural services	Cultural services include tourism, recreation, landscape values, coastal identity, spiritual values, and the cultural importance of the sea for coastal communities. In the south-central region of Mozambique, these services are particularly relevant in areas such as Bazaruto, Vilankulo, Inhassoro, Tofo, Barra, Pomene, and coastal zones associated with marine tourism, diving, megafauna observation, recreational fishing, and coastal scenery. Coral reefs, beaches, clear waters, islands, sheltered bays, seagrass meadows, and the presence of marine megafauna support a significant part of the regional tourism and recreational value. The open sea also contributes to these services through recreational fishing, whale watching, and other uses associated with ocean tourism.

5.4.8.4 Relevance for the offshore seismic acquisition Project

The proposed seismic activity is temporary, mobile, and located in an offshore environment. It does not involve permanent seabed occupation, conversion of coastal habitats, or direct exploitation of biological resources.

However, the assessment should not be limited to the physical acquisition area. It must consider the indirect influence area, underwater noise propagation, navigation routes, fishing zones, sensitive habitats, the presence of marine megafauna, and accidental risks. The most relevant ecosystem services for the Project are, therefore:

- the supply of fish and shellfish, due to their importance for artisanal fishing and food security;
- nursery, breeding, feeding, and migration habitats, due to their link to biodiversity and fisheries resources;
- the maintenance of sensitive habitats, such as mangroves, seagrasses, and reefs, due to their ecological function and vulnerability to pollution;
- cultural services associated with coastal and marine tourism;
- regulation services provided by coastal habitats, especially in accidental scenarios.

5.5 Socioeconomic Framework

5.5.1 Introduction

This chapter presents the preliminary social and economic characterisation of the terrestrial and maritime influence area of the proposed offshore seismic survey project off the coast of the districts of Inhassoro, Vilankulo, and Massinga, in the Province of Inhambane, Mozambique. (Figure 5-13). The characterisation developed aims to describe the socioeconomic context relevant for the preliminary framing of the project, with particular emphasis on the fisheries sector, given its centrality in the region's coastal economy.

The description presented is preliminary in nature and proportionate to the level of detail typical of an EPDA, focusing on identifying the structuring socioeconomic elements of the area and the sensitivities relevant for a preliminary understanding of the socioeconomic context.

The characterisation is centred on the three coastal districts directly adjacent to the area planned for offshore operations (Inhassoro, Vilankulo and Massinga), without prejudice to the provincial and national contextualisation necessary for its framing. Neighbouring districts such as Govuro (Inhambane) and Machanga (Sofala) are cited punctually only when relevant for regional contextualisation or for a comparative reading of the available statistical information, and do not constitute an autonomous subject of this study.

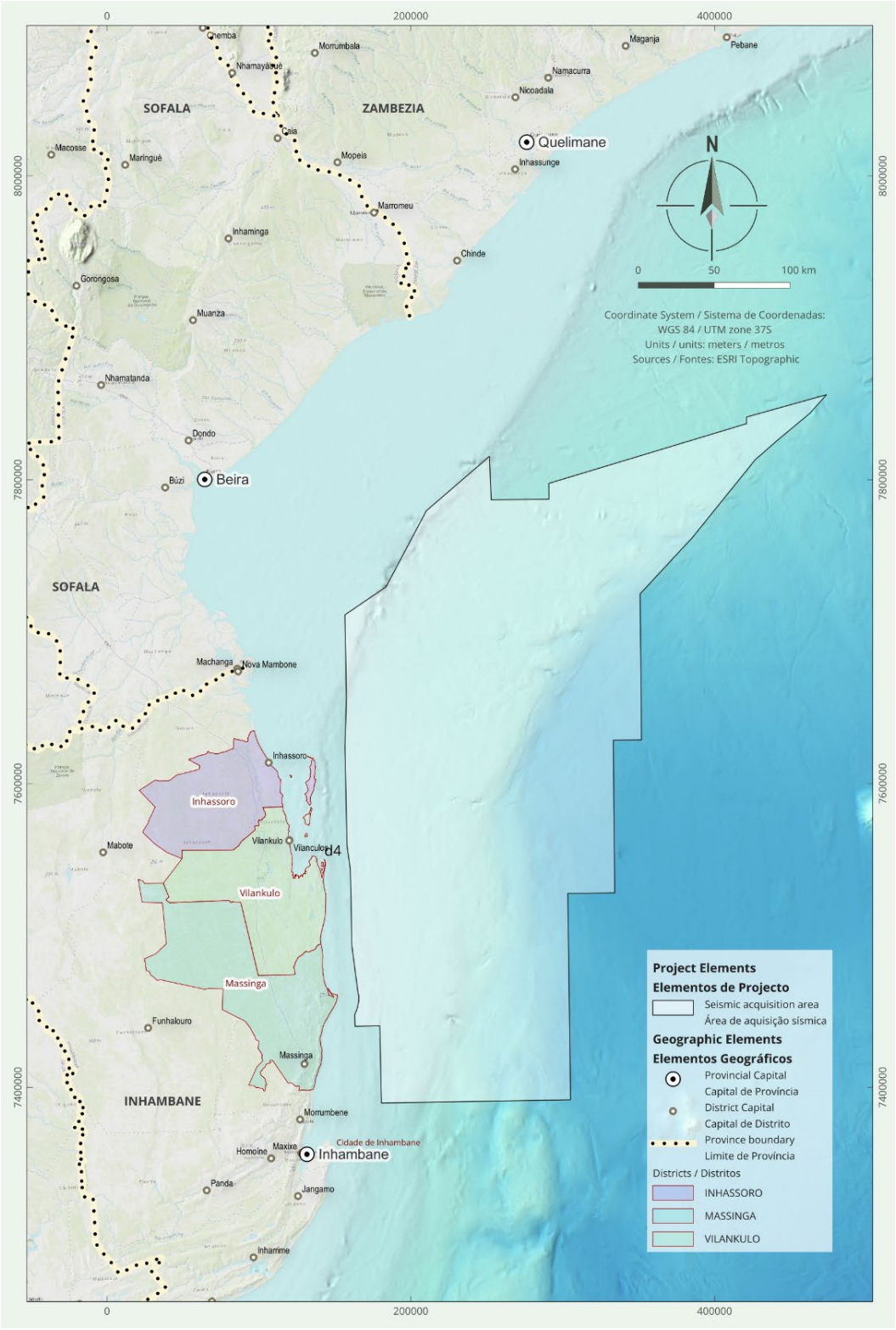


Figure 5-13: Administrative Framework of the seismic exploration areas

5.5.2 Administrative and territorial framework

The three districts in question are part of Inhambane Province, located in the southern region of Mozambique, whose capital – the city of Inhambane – is located about 500 km north of Maputo. The province covers an area of approximately 68,615 km² and, in 2017, had 1,496,824 inhabitants, distributed across 14 districts and six municipalities. The province has a coastline of approximately 700 km, complemented by significant inland water resources, which support notable marine and inland fisheries at a national level.

The three coastal districts covered by the preliminary direct influence area: Inhassoro, Vilankulo, and Massinga, are located in the north-central sector of the province, aligned along National Road No. 1 (EN1) and the coastal strip of the Indian Ocean. Their administrative and territorial characteristics are summarised in the Table 5-10.

Table 5-10: Administrative and demographic summary of the covered districts

District	Area (km²)	Population (reference)	Headquarters / Main Town	Notes
Inhassoro	~4,758	The population was estimated at 56,000 inhabitants in 2012, with growth projections to around 70,000 in 2020	Town of Inhassoro	Includes the islands of the Bazaruto Archipelago (Bazaruto and Santa Carolina).
Vilankulo	~5,869	Eestimated in 2022 at approximately 151,700 inhabitants	Vila/Cidade de Vilankulo (Municipality)	District headquarters of a municipality; young age structure (around 44% of the population under 15 years old, according to consulted sources).
Massinga	~7,458	236,900 (2017 Census)	Town of Massinga	Extensive coastal front with dunes, beaches, and fishing villages.

The **district of Inhassoro** is located in the northern sector of the province, bordering Govuro to the north, Vilankulo to the south, Massinga to the west, and the Indian Ocean to the east. It includes the islands of the Bazaruto Archipelago and Santa Carolina.

The **district of Vilankulo** is located immediately south of Inhassoro, bordered to the west by the districts of Mabote and Funhalouro, to the south by Massinga, and to the east by the Indian Ocean. It is the only one of the three districts to have a municipality (Municipality of the City of Vilankulo) and constitutes the main land and air gateway to the Bazaruto Archipelago.

The **district of Massinga** is located in the central-east of Inhambane, with its headquarters in the town of Massinga, along the EN1, being bordered to the east by the Indian Ocean, with an extensive coastal front characterised by coastal dunes, beaches, and fishing villages.

5.5.3 Population and Pattern of Settlement

The three districts exhibit typically rural demographic structures, with a strong predominance of the population residing in rural areas, young age structures, and high proportions of the population under 15 years old. Consulted sources indicate, for the three districts, a slightly higher proportion of women than men, a pattern that may be associated with male migratory flows out of the districts for work reasons.

In terms of settlement pattern, a population concentration is observed along:

- the coastal strip, in fishing villages, district headquarters, and communities associated with fishing centres and tourism activities;

- National Road No. 1 (EN1), which structures the main communication axis between the three districts and which polarises commercial and administrative settlements;
- from the proximity to the Bazaruto Archipelago, in Inhassoro and Vilankulo, with population attraction effects associated with tourism and fishing activities.

The Massinga district has the largest area of the three and a predominantly rural population, with low levels of literacy and command of Portuguese, particularly among women, with Chopi being the dominant mother tongue. In Inhassoro and Vilankulo, the main ethnolinguistic groups identified in the consulted sources correspond to the Matsua, Ndau, and Bitonga groups, with variations between administrative posts.

Population density is generally low, although concentrations are recorded along the EN1 and in coastal areas, particularly near the district headquarters and the main fishing communities.

5.5.4 Economic activities and livelihoods

The economy of the three districts is markedly based on primary activities, with high dependence on natural resources. Economic activities and livelihoods can be broadly grouped into:

- **Subsistence activities**: artisanal fishing, subsistence family farming, raising small ruminants and domestic fowl, gathering in intertidal zones, small informal trade, and charcoal and construction material production;
- **Income-generating activities**: semi-industrial and industrial fishing (predominantly based in other ports), tourism (particularly significant in Inhassoro and Vilankulo, associated with the Bazaruto Archipelago and the Vilankulo Wildlife Sanctuary), formal trade, small-scale industry (fish processing, metalworking, carpentry, bakeries, mills), and natural gas exploration in the Pande-Temane concession operated by Sasol, mainly in Govuro and Inhassoro.

Family farming is practised in all three districts, with typical food crops (maize, cassava, cowpea, groundnut, sweet potato, sorghum) and commercial crops varying by district, notably cotton in Vilankulo and cashew and coconut production in Massinga.

Artisanal fishing, described in more detail in the following section, is a central pillar of the local economy in all three districts, with particular emphasis in Inhassoro and Vilankulo, and a structuring role in food security and coastal family economies.

Tourism is of growing importance in Inhassoro and Vilankulo, benefiting from the Strategic Tourism Development Plan, which identifies the Vilankulo/Inhassoro/Bazaruto area as one of the main priority areas for tourism investment nationally. In Massinga, tourism is less significant.

Small trade and services are concentrated mainly in the district headquarters and along the EN1, with a moderate increase in the number of licensed commercial establishments in the districts of Inhassoro and Vilankulo recorded between 2021 and 2022, according to consulted sources.

The **extractive industry** is significant in Inhassoro, within the context of the Pande-Temane natural gas concession operated by Sasol, with associated infrastructure in the district, including the Temane thermal power plant.

Generally, and in line with the provincial framework, there is a strong dependence of coastal communities on marine and intertidal resources, both for food consumption and for income generation, which gives the fisheries sector centrality in the livelihoods of the resident population.

5.5.5 Fisheries Industry

5.5.5.1 Framework of the Maritime Fishing Regulations

Decree No. 89/2020, of 8 October, approves the Maritime Fishing Regulation (REPMAR), which provides for and differentiates various types of fishing, according to the purpose of the activity, the type of vessel, the technology used, and the resource management framework. In general terms, maritime fishing in a broad sense (covering all capture, search, and preparation operations for aquatic species), subsistence fishing, artisanal fishing, semi-industrial fishing, and industrial fishing are highlighted, as well as special modalities such as recreational/sport fishing, and fishing for scientific, museum, ornamental, and aquaculture purposes.

Table 5-11: Summary of the Regulatory Framework

Regulatory Topic	Summary of Applicable Requirements and Provisions
Subsistence Fishing and Special Modalities	Subsistence fishing is typified as a small-scale activity, carried out by local operators for their own consumption and that of their household, subject to administrative registration and strongly limited in terms of the type and number of gear (gillnets, traps up to 10 m, restricted number of traps, simple handline or rod with up to 3 hooks), maximum daily quantities (up to 5 kg/day per fisherman) and area of operation (up to 1 nautical mile from the coast), with the use of harmful or unregulated gear and methods being prohibited. Recreational and sport fishing is referred to a specific regulation, maintaining-itself outside the commercial fishing regime, while fishing for museums, ornamental/aquarium purposes, and aquaculture is é subject to special licences, definition of species, areas, methods, and quantities, and coordination with CITES rules and other conservation legislation, Fishing Gear, Effort, and Areas of Operation
Fishing Gear, Effort, and Areas of Operation	On a technological level, REPMAR defines maritime fishing according to the gear used, listing, among others, trawl nets (bottom, pelagic, semi--pelagic), purse seines, gillnets (set, drift, trammel, multipurpose), hook gear (handline, trolling, longline), traps (cages, pots, traps, fish traps, nets), harpoons, wounding devices (harpoon, spears, spearguns) and gathering, fixing for each a minimum mesh size, dimensions, maximum number of units, and areas of operation. The use of higher-impact gear (e.g., trawling, deep-water seining, set gillnets beyond certain distances, harpoons) is, as a rule, reserved for semi-industrial and industrial fishing, in areas far from the coast and, often, with additional restrictions in bays, estuaries and coral areas, whereas artisanal and subsistence fishing is confined to gear and areas of lower effort, compatible with the conservation of coastal ecosystems and resources areas, whereas artisanal and subsistence fishing is confined to gear and areas of lower effort, compatible with the conservation of coastal ecosystems and resources.
Classification of Vessels and Effort Control	REPMAR classifies vessels as artisanal, semi--industrial, and industrial, associating-them with types of fishing and authorised gear, as well as limits on length, gross tonnage, engine power, and mandatory equipment, which directly conditions the scale of the fishery and the admissible effort per fishing unit. This regulatory framework is complemented by licensing rules, operational areas (annexes of authorised areas and gear by type of vessel and resource), monitoring, and specific measures for the prevention and combating of illegal, unreported, and unregulated fishing, which aim to ensure the sustainable exploitation of marine fishery resources under Mozambican jurisdiction, which directly conditions the scale of the fishery and the admissible effort per fishing unit. This regulatory framework is complemented by licensing rules, operational areas (annexes of authorised areas and gear by type of vessel and resource), monitoring, and specific measures for the prevention and combating of illegal, unreported, and unregulated fishing, which aim to ensure the sustainable exploitation of marine fishery resources under Mozambican jurisdiction.
Fishing Limits and Coastal Artisanal Fishing	The REPMAR establishes, firstly, minimum distance limits from the coast for the exercise of vessel fishing activity, applicable to all gear: no vessel fishing activity may be carried out less than a quarter of a nautical mile from the coast, measured from the baseline drawn on an officially recognised nautical chart. These general limits are then specified by gear type and vessel category, fixing-for example, that industrial trawling can only operate, depending on the fishery, beyond 3 or 12 nautical miles and at certain minimum depths, semi-industrial beyond 1 or 3 miles (depending on the length of the vessel ion), and artisanal motor trawling beyond half a nautical mile from the coast, with trawling in coral areas being expressly prohibited. Regarding artisanal coastal fishing, the REPMAR classifies maritime fishing according to the purpose and means employed and defines artisanal coastal fishing as that practised between 1 and 12 nautical miles, with vessels up to 13 metres in length and engine power greater than 40 hp (30 kW) and equal to or less than 140 hp (105 kW). It distinguishes-it from local artisanal fishing (without a

Regulatory Topic	Summary of Applicable Requirements and Provisions
	vessel until 1/4 mile or with a vessel until 3 miles, with power up to 40 hp) and from semi--industrial and industrial fleets, which has direct implications on the spatial limits of operational, in the permitted arts and in the requirements for licensing, maintaining, in any case, respect for the distances minimums to the coast, fishing zones defined in Annex II and other specific restrictions by gear (e.g. gillnets, seines, longlines, traps).

5.5.5.2 Fishing Centres of Phishing, CCPs and Community Organisation

Artisanal fishing is, as a rule, organised into Fishing Centres (CPs), places where vessels, fishing gear and materials are concentrated and where catches are landed. Nationally, there are approximately 1,586 registered fishing centres, of which about 792 are in marine waters. In the Province of Inhambane, there are about 174 fishing centres, of which 105 are in marine waters (IDPPE, 2013).

Community Fishing Councils (CCPs), established from 2009, are community organisations with the function of contributing to the participatory management of fisheries, ensuring compliance with current management measures, mediating conflicts and promoting the sustainability of the activity and the improvement of the population's living conditions. Their organisational structure generally includes a President, Secretary, Councillor, Treasurer and Auditors. Various sources indicate constraints in the functioning of CCPs, namely limitations of financial resources, low contribution to the common fund, absence of own facilities and difficulties in institutional coordination (IDEPA, 2019).

The information available for the districts under study is summarised in the Table 5-12

Table 5-12: Fishing Centres and Community Fishing Councils in the covered districts (preliminary information)

District	No. of fishing centres (CP)	No. of Community Fishing Councils (CCP)	Designations of CCPs identified in the sources
Inhassoro	16	8	Nhanbabue, Vuca, Petane, Fequete, Mucocuene, Tsondzo, Mongorebane and Nhangondzo
Vilankulo	20	8	Chigamane, Macunhe, Mangalisse, Chicocane, Quewene, Bairro Desse and 19 de Outubro (one of the designations may not be present in the sources; total of 8 CCPs reported)
Massinga	5	Not available	Chibunhane, Morrungulo, Pomene, Macachula and Chiduca

In addition to the institutional framework, there are fishermen's and fish marketing associations, notably in Inhassoro, where, among others, the Inhassoro Fishermen's Association (API), the Mozambican Association of Inhassoro Fishermen (AMOPI), the Inhassoro Fish Marketing Association (ACOPEGI/ACOPEI) and the association "Graças a Deus de Inhassoro" were identified. The consulted sources do not provide consolidated equivalent listings for Vilankulo and Massinga.

It is also important to mention, in the case of the Bazaruto Archipelago, the activities of participatory management organisations associated with the Bazaruto Archipelago National Park (PNAB), which include the Bazaruto Archipelago Fishermen's Association, identified in the consulted sources as an interlocutor for the island fishing communities.

5.5.5.3 Fishing vessels, gear and autonomy

The vessels used in artisanal fishing in the districts under study present distinct patterns among themselves, depending on environmental factors, proximity to the archipelago, and the scale of fishing practiced. From the consolidated information in the consulted sources (IDPPE, 2013), the following elements stand out:

- Inhassoro: predominance of flat-bottomed boats (around 58%) and rafts (around 43%, exclusive to this district among those covered); significant presence of motorised launches (around 36%) and low representation of canoes (less than 1%); fibreglass boats with still limited use (around 7%). Approximately 280 vessels were registered;
- Vilankulo: predominance of flat-bottomed boats (around 74%), followed by canoes (around 11%) and launches (around 12%); limited use of rafts. Approximately 183 vessels were registered;
- Massinga: detailed information by type and number of vessels is not available in the consulted sources.

The autonomy of vessels in Inhambane Province is characterised by the clear predominance of vessels with autonomy of less than 12 hours (around 93%), with minority proportions of vessels with autonomy between 12 and 24 hours and a residual number with autonomy of more than 24 hours. This distribution is consistent with a half-day artisanal fishing pattern, operating, as a rule, in waters close to the coast.

The fishing gear used reflects the environmental characteristics and target resources of each district. Data from the consulted sources indicate:

- Inhassoro: predominance of handline and beach seine; significant use of harpoon; also occurrence of gillnets; expressive diving fishing, with particular incidence in the capture of fish, lobster and sea cucumber, in reef, rocky and seagrass areas;
- Vilankulo: predominance of handline and beach seine, with the use also of traps, diving, harpoon, purse seines and gillnets (the latter on a smaller scale);
- Massinga: the consulted sources confirm the importance of artisanal fishing, without, however, providing disaggregated data on the composition of fishing gear for the district.

Also mentioned, in the provincial context, are unconventional and harmful gear, namely the 'chicocota' (a very small-meshed trawl net) and the 'quinia' (a small-meshed net, often associated with illegal mosquito nets), the use of which is subject to control and inspection by sectoral authorities.

Regarding closed seasons and fishing bans, and in accordance with the national regulatory framework, specific periods are in force for various species, with particular relevance for Inhambane Province being the closed season for octopus (1 January to 29 February). Additionally, fishing with trawl nets and surface gillnets is subject to further restrictions during closed seasons applicable to other fisheries.

5.5.5.4 Production, landing, marketing, and preservation of fish

Consolidated information from official sources indicates that, between 2018 and 2020, artisanal fishing production in Inhambane Province evolved from approximately 33,658 tonnes to around 44,956 tonnes, with marine fish representing over 70% of the total. Other resources such as crab, tuna and related species, cephalopods, also registered increases during the period. At the district level, available data point to strong year-on-year fluctuations between 2020 and 2023, with Vilankulo recording significant drops until 2022 and a very significant recovery in 2023.

Artisanal fishing activity is typically landed at fishing centres, with the fish subsequently marketed in local markets and, in part, in markets in other regions. Among the formal infrastructures identified in the districts under study, the Inhassoro Fish Market, located in the town of Inhassoro, stands out. For Vilankulo and

Massinga, the consulted sources do not identify equivalent formal markets, although they confirm the existence of local marketing points associated with fishing centres and district headquarters.

Fish preservation relies mainly on traditional methods (salting, drying, smoking) and, to a lesser extent, on freezing and refrigeration with ice. In Inhassoro, the regional prevalence of the freezing method is observed, with a relatively high number of fishing centres using this technique. Limitations observed in terms of preservation methods, post-capture losses, and storage capacity are pointed out by the consulted sources as relevant structural constraints of the sub-sector.

In terms of processing, the sources identify, particularly in the Inhassoro district, the presence of several fish processing and marketing companies (among which Pescaria do Índico, Master Rich Investments, Cosmos Sea Foods, Vida Investments and Cheila To e Wei International Ltd, according to the consulted sources), which reinforces the position of this district as a logistical hub for the artisanal and semi-industrial coastal fishing sub-sector in the region. For Vilankulo and Massinga, the consulted sources do not identify comparable units, although the presence of micro-enterprises and informal fish processing operators is recognised.

5.5.5.5 Semi-industrial, industrial, and recreational/sport fishing

Semi-industrial and industrial fishing

Semi-industrial and industrial fishing are defined by the Maritime Fishing Regulation (Decree No. 89/2020) based on vessel characteristics, engine power, onboard preservation and processing methods, and spatial operating limits. In general terms, semi-industrial fishing operates from one nautical mile from the baseline (with exceptions for certain fisheries), while industrial fishing is authorised to operate from three nautical miles from the baseline, with no upper limit for distance.

The national semi-industrial and industrial fishing fleet is concentrated in the base ports of Maputo, Beira, and Quelimane. In Inhambane Province, some vessels licensed for semi-industrial line fishing are identified, with the activity strongly directed towards demersal fish and tuna, without a significant base port established in the area of the three districts under study. Industrial shrimp and prawn fishing operates predominantly in the Sofala Bank and along the continental slope, in the sector immediately north of the project's preliminary area of influence.

The presence of semi-industrial and industrial fishing operations directly on the coast of the districts of Inhassoro, Vilankulo, and Massinga is, according to the consulted sources, relatively reduced compared to the Sofala Bank. Nevertheless, the maritime area off these districts is part of the zone reserved for industrial fishing (beyond 12 nautical miles, according to REPMAR), specifically for methods such as industrial fish trawling, industrial longlining, and industrial vessel-anchored gillnetting.

Recreational and sport fishing

Recreational and sport fishing is regulated by Decree No. 82/2021, of 15 October, and has assumed significant importance in Inhambane Province, in close association with the tourism development of the coast and the Bazaruto Archipelago. In 2022, Inhambane Province accounted for approximately 53.7% of national licences for this activity. In 2024, the province remained the main one nationally in terms of the number of licensed practitioners, with particular emphasis in the districts of Inhassoro and Vilankulo.

The activity is practised both from land (rod and reel) and from recreational boats, generally small and medium-sized, equipped with outboard motors, which operate predominantly in continental shelf waters up to depths of around 200 m. Target resources include large pelagic fish (marlin, tuna, dorado, kingfish, trevally) and some coastal water species. The Bazaruto Archipelago is referenced in consulted sources as one of Africa's most relevant destinations for sport fishing.

5.5.5.6 Tourism, navigation and other uses of maritime space

Tourism

Tourism, alongside fishing, is one of the most relevant economic activities in the coastal area under study, with particular emphasis in Inhassoro and Vilankulo. The Vilankulo/Inhassoro/Bazaruto area is identified by the Strategic Tourism Development Plan as one of the main priority areas for tourism investment in Mozambique. The Bazaruto Archipelago National Park (PNAB) constitutes the main tourist attraction of the region, offering consolidated marine tourism, diving, marine species observation (notably dugongs and sea turtles) and sport fishing. Vilankulo also has an airport with regular connections, reinforcing its role as a tourist gateway to the archipelago.

According to consulted sources, the hotel and restaurant sector in Inhambane Province shows some recent year-on-year fluctuation, although there remains a significant presence of establishments classified as "lodges", particularly in the Vilankulo–Inhassoro area.

In Massinga, tourism activity is less significant, although the existence of a potentially attractive coastline and smaller-scale tourist accommodation is recognised.

Navigation and maritime traffic

The maritime area in question is part of the Mozambique Channel, an important international trade route, used by general cargo ships, container ships, tankers, cruise ships and long-distance fishing vessels. The routes usually followed are generally at substantial distances from the coast, although approaches between 20 and 25 nautical miles are recorded in the stretch between Beira and Maputo. The Channel does not currently have a formally established Traffic Separation Scheme, with navigation based on customary lanes.

Alongside international commercial traffic, the area is used by:

- artisanal and semi-industrial fishing vessels in their usual coastal operation patterns;
- recreational and sport fishing vessels, particularly in the Vilankulo–Inhassoro–Bazaruto stretch;
- support vessels for tourism (passenger transport between the mainland and the islands of the Bazaruto Archipelago);
- vessels associated with oil and gas operations in the Pande-Temane concession and offshore exploration activities in the Save Basin and adjacent basins;
- domestic coastal shipping vessels.

The main local ports and anchorages identified in the consulted sources correspond to the administrative centres of Inhassoro and Vilankulo and anchorages associated with the islands of the Bazaruto Archipelago, used primarily for fishing, tourism and supply.

Other uses of maritime space

Also noteworthy in the maritime area in question are:

- the presence of areas with special protection and management regimes, namely the Bazaruto Archipelago National Park;
- the presence of hydrocarbon concessions (Pande-Temane and associated exploration blocks), with potential operational linkage to the coastal maritime space;
- intertidal zone collection activities, with a strong social and subsistence component, particularly in the bays and sandbanks of the Bazaruto Archipelago islands and in the coastal areas of the three districts.

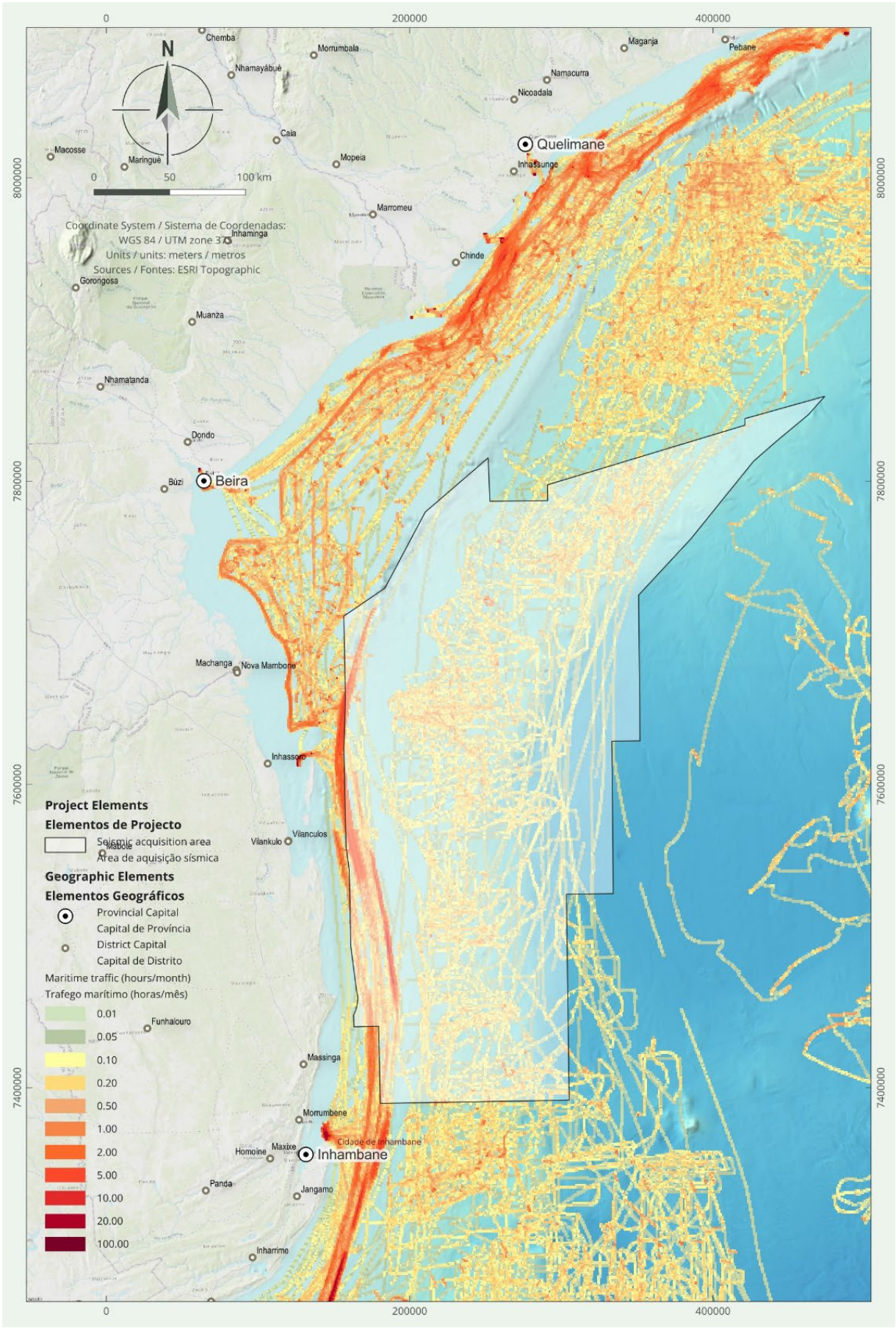


Figure 5-14: Traffic Maritime (hours/month)

5.5.6 Cultural heritage and social use of the coastal zone

The coastal zone of the three districts presents a significant symbolic, social, and cultural load, associated with the communities' long fishing tradition, the presence of structured fishing villages, cultural and religious practices associated with the sea (including animist worship sites, particularly in rural communities), and historical and archaeological references. Vilankulo, in particular, is referenced in the consulted sources as housing the Manyikeni archaeological station and other historical references associated with Vilankulo Bay.

The Bazaruto Archipelago, given its environmental, historical, and tourist relevance, constitutes simultaneously a space of high cultural sensitivity and significant social use. The provided sources do not contain consolidated records of specific underwater cultural heritage in the maritime front of the districts in question, although the possibility of its occurrence cannot be excluded, given the historical intensity of maritime routes in the Mozambique Channel.

The coastal strip is also a space for close social use, namely for circulation, collection, leisure, and small informal economic activities, with a strong female and child presence in certain practices (intertidal collection, fish processing and trade).

5.5.7 Interaction with Operational Areas

The seismic acquisition area is located entirely in an offshore environment Figure 5-15, off the central-south coast of Mozambique, with no overlap with land areas, coastal districts, islands, or coastal-marine conservation areas.

The distances to the coast indicated in the cartography vary between approximately 13.7 km and 109.3 km, with the shortest distances observed in the Inhambane sector, particularly off Massinga, Vilankulo, and Inhassoro.

Although this sector is located relatively close to ecologically sensitive areas, such as the Bazaruto Archipelago and the São Sebastião Peninsula, the acquisition area does not overlap with these zones.

At the research level, the eastern limit of the seismic acquisition area, in the southern sector, intercepts its boundary with the 12 nautical miles limit, a limit up to which artisanal coastal fishing extends.

The potential interaction of the Project with the coastal environment is, therefore, predominantly indirect.

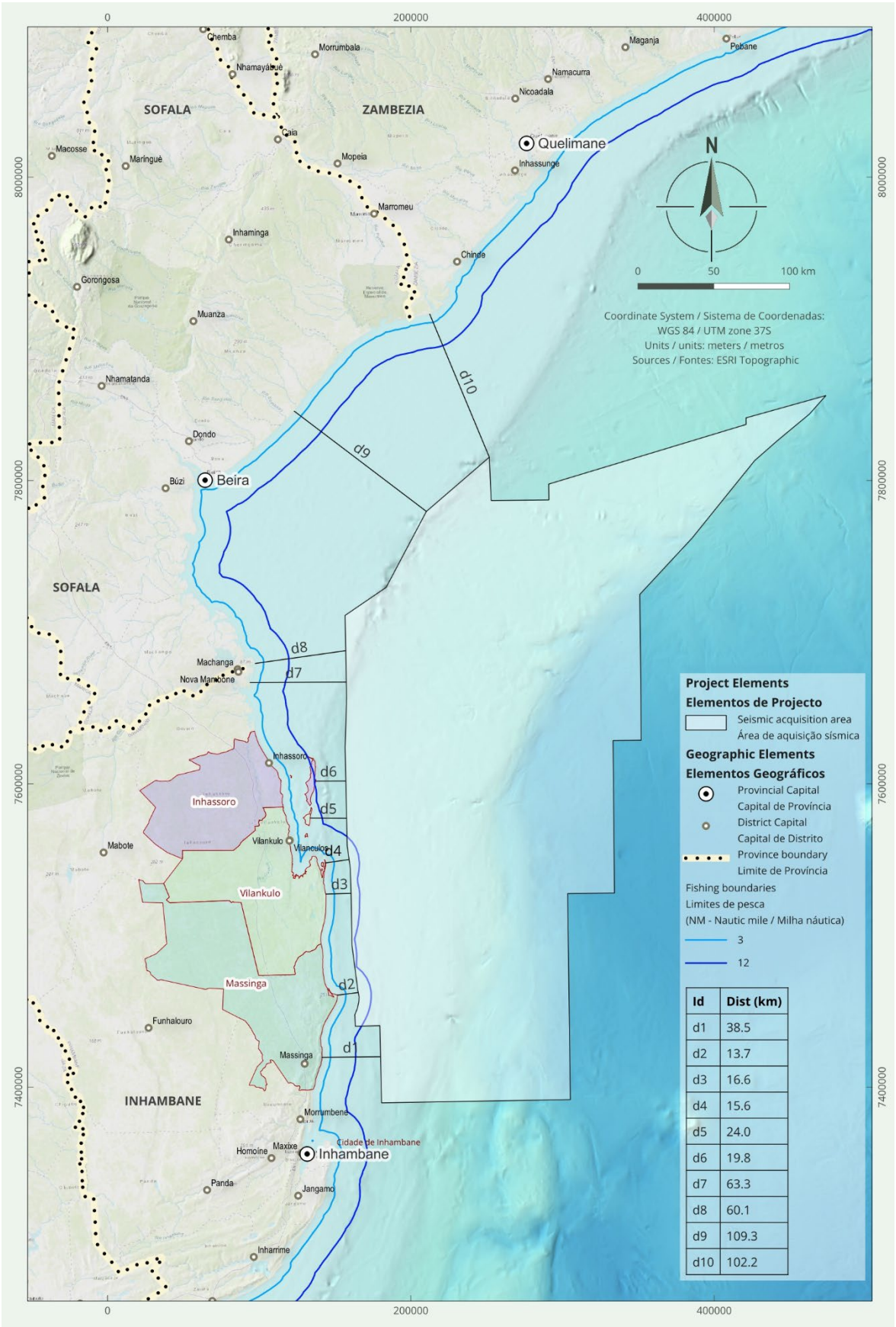


Figure 5-15: Distance from the coast to the seismic acquisition area

6 POTENTIAL ENVIRONMENTAL IMPACTS AND FATAL FLAWS

The objective of this chapter is to present a preliminary identification of the potential impacts, environmental and social, associated with the 3D Marine Seismic Acquisition Project, as well as to conduct an initial analysis of the possible existence of environmental or social constraints likely to constitute fatal flaws to the Project's implementation.

It is important to highlight that, at this stage of the Environmental Pre-Feasibility Study and Scoping (EPDA), a detailed assessment of the impacts is not intended. This assessment will be developed in the subsequent phase of the EIA process, through specialised studies, fieldwork, specific modelling, and in-depth technical analyses, which will allow for the characterisation, prediction, and assessment of the significance of the Project's impacts, environmental and social, as well as the definition of adequate mitigation, monitoring, and environmental management measures.

Thus, the impacts presented in this chapter correspond to a preliminary identification based:

- On the conceptual and operational description currently available for the Project;
- On the existing knowledge of the potentially affected biophysical and socioeconomic environment;
- On the technical and professional experience of the consulting team in environmental assessment processes for similar offshore seismic operations; and
- On international best practices applicable to the offshore oil and gas sector.

The preliminary identification of potential impacts was carried out through a systematic analysis of the interactions between the Project's planned activities and the potentially affected environmental and social receptors, considering:

- The different phases of the Project (mobilisation, operation, and demobilisation);
- Impacts direct, indirect, cumulative, and accidental;
- Impacts temporary and reversible;
- Interactions with fishing activities, navigation, and other uses of maritime space; and
- Potential effects on sensitive marine ecosystems and species.

The potential impacts identified at this stage should therefore not be interpreted as a conclusive assessment of the Project's environmental significance. On the contrary, they constitute a preliminary basis for guiding the technical scope of the EIA, including the need for specialised studies, underwater acoustic modelling, assessment of interactions with fishing and navigation, risk analysis, and definition of environmental mitigation and management measures.

It is also highlighted that, based on the information currently available and international experience with comparable offshore seismic operations, no evidence of fatal environmental or social failures that would preclude the Project's implementation at the outset has been identified at this preliminary stage. However, this preliminary conclusion should be confirmed and deepened during the EIA phase, in light of the results of specialised studies and the public participation process.

A Table 6-1 presents the preliminary identification of the main impacts potentially expected, as well as examples of general prevention, mitigation, and management measures that may be considered and subsequently deepened, adjusted, and confirmed during the EIA phase, based on the results of specialised studies, technical modelling, field work, and the public participation process.

Table 6-1: Preliminary Identification of Main Impacts and General Prevention and Mitigation Measures

Project Phase	Activity	Associated Environmental and Social Aspects	Potentially Affected Receptors	Potential Impacts	Main Internationally Consolidated Mitigation Measures
Mobilisation	Transit of seismic vessel, support vessels, and associated craft	Underwater noise associated with navigation	Marine mammals, sea turtles, fish	Temporary behavioural disturbance of marine fauna	Implementation of controlled operational speeds; visual observation of marine fauna; adherence to established shipping lanes; crew training in sighting and reporting procedures
	Supply and maritime logistics operations	Operational discharges and spill risk	Water quality and marine ecosystems	Localised alteration of water quality	Compliance with MARPOL Convention; adequate waste management; preventive equipment maintenance; availability of spill response kits and plans
	Introduction and operation of international vessels	Ballast water and biofouling	Marine ecosystems	Introduction of invasive species	Implementation of Ballast Water Management Plan; compliance with the International Convention for the Management of Ballast Water; periodic hull cleaning and inspection
	Temporary presence of offshore vessels	Interference with navigation and fishing	Maritime navigation and fishing sector	Conflicts of use and temporary restrictions	Prior disclosure of activities; continuous communication with INAMAR, ADNAP and fishing communities; issuance of Navigation Warnings; implementation of Fisheries Interaction Management Plan
Operation / Seismic Acquisition	Operation of airgun arrays	Emission of impulsive underwater noise	Marine mammals, sea turtles and fish	Behavioural disturbance and potential physiological effects	Implementation of soft-start/ramp-up; definition of exclusion zones; presence of Marine Mammal Observers (MMO); shutdown in case of sightings; PAM during night-time or low visibility periods; operational planning to avoid sensitive areas and critical ecological periods

Project Phase	Activity	Associated Environmental and Social Aspects	Potentially Affected Receptors	Potential Impacts	Main Internationally Consolidated Mitigation Measures
Operation / Seismic Acquisition	Continuous operation of seismic acquisition	Cumulative acoustic exposure	Sensitive marine fauna	Impacts cumulative acoustic	Prior acoustic modelling; optimisation of seismic lines; limitation of simultaneous activities; regional coordination of seismic activities; adaptive monitoring
	Operation of airgun arrays	Temporary alteration of fish school distribution	Fishing sector	Temporary reduction in catches and displacement of fishing activities	Prior communication with fishermen; establishment of permanent communication channels; monitoring of fishing vessels; complaint management; maintenance of navigation and fishing corridors whenever possible
	Towing of streamers and seismic equipment	Physical presence of towed equipment	Navigation and fishing	Risk of collision or interaction with fishing gear	Implementation of safety zones; escort by support vessels; AIS/VMS monitoring; adequate maritime signalling; continuous communication with nearby vessels
	Operation of seismic and support vessels	Atmospheric emissions	Air quality and climate	GHG and atmospheric pollutant emissions	Efficient engine maintenance; fuel consumption optimisation; use of IMO-compliant fuels; reduction of idling times
	Continuous offshore operation	Waste generation and management	Marine environment	Marine contamination	Implementation of Waste Management Plan; adequate segregation and storage; discharge only at authorised onshore facilities
	Prolonged presence of vessels	Artificial night-time lighting	Seabirds	Attraction and disorientation of birds	Minimisation of non-essential lighting; direction of lights; adoption of light attraction reduction practices
	Emergency operations and air support	Sporadic use of helicopters	Marine fauna and birds	Temporary disturbance	Limitation of flights to strictly necessary; definition of preferred routes; maintenance of adequate operational altitude

Project Phase	Activity	Associated Environmental and Social Aspects	Potentially Affected Receptors	Potential Impacts	Main Internationally Consolidated Mitigation Measures
Demobilisation	Recovery of streamers and equipment	Temporary maritime activities	Navigation and fishing	Temporary interference	Coordinated planning of operations; prior disclosure; maintenance of maritime communication measures
	Departure of vessels from the project area	Underwater noise associated with maritime traffic	Marine fauna	Temporary disturbance	Application of the same management measures implemented during mobilisation
Accidental Scenarios	Accidental spillage of fuels or lubricants	Marine contamination	Marine ecosystems, fishing and coastal communities	Degradation of water quality and biological impact	Spill Emergency Plan; containment and recovery equipment; specific team training; immediate communication to competent authorities
	Collision between vessels and marine fauna	Physical interaction	Cetaceans and marine turtles	Injury or mortality	Continuous observation; speed reduction in sensitive areas; route deviation procedures when safe
	Interaction with fishing gear	Damage or loss of gear	Fishing communities	Impacts economic and social conflicts	Permanent communication with fishermen; complaints mechanism; compensation procedures as applicable; presence of fisheries liaison officers
	Accidental loss of equipment at sea	Introduction of solid waste	Benthic ecosystems and fishing	Obstruction of fishing gear and impacts localised on the seabed	Inventory and traceability of equipment; recovery procedures; reporting to maritime authorities; post-operation inspections

6.1 Cumulative Impacts and Transboundary

The assessment of cumulative impacts considers the project's contribution to existing or foreseeable pressures on the same receptors, including:

- Other geophysical, exploratory or research operations in the region, overlapping in space or time.
- Commercial and fishing maritime traffic and associated anthropogenic underwater noise.
- Industrial and artisanal fishing activities with concurrent use of maritime space.
- Any other foreseeable projects with potential interaction on shared receptors, including protected areas and sensitive habitats.

The assessment of transboundary impacts considers, in particular, the long-distance acoustic propagation, the movement of migratory species shared with neighbouring oceanic states and the shared use of fishing resources and maritime space. The analysis will be conducted in accordance with applicable international guidelines, observing, where relevant, principles of notification and cooperation.

6.2 Risks and accidental scenarios

The EIA includes a specific analysis of the risks and accidental scenarios associated with offshore seismic operations, without assuming that low probability dispenses with their management. The following scenarios are considered, at a minimum:

- Spillage of fuel, oil or other chemicals from vessels.
- Collision between vessels or between vessels and marine fauna (particularly cetaceans and turtles).
- Entanglement or damage to fishing gear by cables, streamers or other towed equipment.
- Loss of streamers or other seismic equipment in the marine environment.
- Fire or explosion on board.
- Medical emergency on board.
- Failure of communication with other sea users, particularly the fishing sector.
- Operational interruption due to extreme weather events (including tropical cyclones).

For each scenario, the probability of occurrence, the potential consequence on exposed receptors, and the resulting significance are assessed, identifying prevention, preparedness, and response measures to be integrated into the project's emergency response plan.

7 TERMS OF REFERENCE

7.1 Introduction

7.1.1 Purpose of the Terms of Reference

These Terms of Reference (ToR) establish the scope, methodological requirements, and minimum content to be considered in the preparation of the Environmental Impact Assessment (EIA) for the 3D Marine Seismic Survey Project in areas AS7 and AS8, located offshore in the centre-south region of Mozambique, off the coast of the provinces of Sofala and Inhambane.

Based on the information contained in the Project Description (Chapter 4), the operation will include mobilisation, seismic acquisition, and demobilisation phases. The currently indicated operational parameters, including average acquisition speed, preliminary acoustic source configuration, number of support vessels, shot interval, source operating depth, logistical support port, and indicative campaign duration, shall be confirmed and updated in the EIA, as they may be adjusted based on the final campaign definition and the environmental mitigation measures that are approved.

These ToR aim to guide the preparation of the EIA, ensuring that the study is technically robust, compatible with applicable Mozambican legislation, and aligned with international best practices for offshore seismic operations. These ToR define the environmental and social themes to be assessed, the necessary specialised studies, the minimum requirements of the baseline situation, the impact assessment methodology, public participation requirements, and the essential elements to be integrated into the Environmental Management Plan.

The EIA should enable the competent environmental authority to assess, in an informed manner, the potential environmental and social impacts associated with the Project, including direct, indirect and cumulative impacts. It should also provide the basis for defining appropriate prevention, minimisation, management, and monitoring measures for the temporary, mobile, and offshore nature of the proposed seismic activity. e Future activities such as exploratory drilling, field development, installation of subsea infrastructure, or hydrocarbon production are not included within the scope of these ToR. Should additional activities or material changes to the Project be proposed, these shall be subject to their own environmental assessment or an update of the EIA, as applicable.

Future activities such as exploratory drilling, field development, installation of subsea infrastructure, or hydrocarbon production are not included within the scope of these ToR. Should additional activities or material changes to the Project be proposed, these shall be subject to their own environmental assessment or an update of the EIA, as applicable.

7.1.2 Specific objectives of the EIA

The EIA to be developed based on these ToR shall fulfil, at a minimum, the following objectives:

- Characterise the Project, including location, phases, activities, equipment, vessels, acoustic sources, logistics, preliminary schedule, and interfaces with existing uses of the maritime space;
- Confirm the effective seismic acquisition area, including final polygons, manoeuvring zones, exclusion areas, navigation corridors, logistical support areas, and any environmental sensitivity zones;
- Characterise the baseline situation of the physical, biological and socioeconomic environment, with detail appropriate to the offshore nature of the activity;
- Assess the potential impacts associated with the mobilisation, operation and demobilisation phases;

- Assess specifically the effects of underwater noise generated by seismic sources on sensitive biological receptors, including marine mammals, sea turtles, fish and other relevant marine organisms;
- Assess potential interference with artisanal, semi-industrial and industrial fishing, navigation, maritime safety, coastal tourism, biodiversity conservation and other uses of maritime space;
- Define mitigation, monitoring and environmental management measures proportional to the risk, including soft-start, exclusion zones, MMO, PAM where applicable, shutdown procedures and reporting requirements;
- Structure the PGA, including responsibilities, operational procedures, monitoring, communication, incident logging and complaint response mechanisms.

7.2 General Methodological Approach for the EIA

The EIA shall adopt an integrated approach, based on environmental and social risk, considering the temporary, mobile and spatially extensive nature of offshore seismic operations, with the following minimum methodological stages:

- Review and consolidation of the Project description and identification of missing critical information.
- Definition of direct, indirect, cumulative and, where relevant, transboundary areas of influence.
- Characterisation of the baseline situation, indicating sources, dates, methods and limitations.
- Identification of sensitive receptors and relevant ecosystem services.
- Underwater acoustic modelling and integration of results into biodiversity and fisheries assessment.
- Impact assessment by phase, receptor, impact source and operational/accidental scenario.
- Definition of mitigation and monitoring measures according to the hierarchy avoid, minimise, restore and compensate where applicable.
- Preparation of the PGA and operational thematic programmes.
- Integration of results from public participation and institutional consultation.
- Identification of residual impacts, uncertainties and adaptive management requirements.

7.2.1 Legal and Normative Framework

The EIA shall present and update the legal framework of the project (Chapter 2) that identifies binding requirements, competent authorities, sectoral authorisations and applicable best practices.

7.2.2 Project Description and Justification

The EIA shall present a project description sufficient to support the identification of impact sources, acoustic modelling, risk assessment and the definition of the PGA. The description shall clearly distinguish confirmed information, preliminary information and assumptions subject to validation.

Minimum elements of the technical description

- Identification of the proponent, award title or sectoral authorisation and relationship with the INP;
- AS7 and AS8 polygons, optimised acquisition area, areas outside polygons necessary for data continuity, manoeuvring zones, transit corridors and environmental exclusions;
- 3D seismic acquisition method, including line geometry, spacing, orientation, velocity, shot interval, number of streamers and cable length, if available;

- Characterisation of the seismic vessel and all support vessels, including dimensions, autonomy, fuel, navigation systems, communications and accommodation;
- Final acoustic configuration: number of airguns, total and per sub-array volume, pressure, tow depth, firing sequence, frequency spectrum, and directivity;
- Mobilisation, streamer and source deployment, acquisition, turning, maintenance, interruption, resumption, and demobilisation procedures;
- Logistical support operations: port(s), refuelling, waste management, crew rotation, material transport, and emergency management;
- Environmental and safety procedures: OMM, PAM, soft-start, shutdown, exclusion zones, communication with fisheries and navigation, reporting, and complaint management.

7.2.3 Areas of influence

The EIA shall define, justify, and map the Project's areas of influence. The direct area of influence shall include, at least, the acquisition area, the seismic spread width, the operational safety zone, manoeuvring areas, transit corridors, and logistical support areas. The indirect area of influence shall include the spatial extent of potential acoustic effects, the range of interactions with navigation and fisheries, migratory corridors for sensitive species, and coastal areas that may be affected by logistical activities, communication, or use conflicts.

The cumulative area of influence shall consider other current or foreseeable activities in the maritime space, including commercial navigation, fishing, hydrocarbon projects, coastal tourism, conservation, port operations, and any contemporary geophysical surveys. The transboundary component shall be analysed if acoustic modelling, navigation routes, oceanographic circulation, or migratory species indicate the possibility of effects beyond Mozambican jurisdiction Mozambican.

7.3 Requirements for Specialist Studies

A baseline situation, characterised from specialty studies, shall be sufficient to distinguish between existing conditions, natural variation, and impacts attributable to the Project. It shall combine robust secondary data, institutional consultation, geospatial information, and primary data collection where necessary to reduce uncertainties that condition the significance assessment or the definition of mitigation. The baseline situation will be described based on studies from various specialties. The baseline situation will be described based on studies from various specialties.

7.3.1 Climate, Oceanography, and Maritime Traffic

The characterisation of the baseline situation shall cover the seismic survey area and its respective area of influence, including offshore operational zones, relevant navigation corridors, associated port activity, and fishing areas with potential for interaction with the Project.

The characterisation shall be based on the analysis of secondary data, available meteo-oceanographic information, maritime traffic data, institutional information, and spatial analysis relevant to the offshore operational environment.

The study will focus on the following components:

- **Offshore Climate**: The climatic component conditions the operational window of the campaign, navigation safety, the towing capacity of seismic equipment, and the definition of periods of greatest meteorological risk. In the offshore context, climate assessment is essential for distinguishing normal conditions from extreme events and for supporting risk management during mobilisation, operation, and demobilisation.

- The **oceanography** directly influences navigation, seismic vessel stability, the behaviour of towed cables, manoeuvring safety, and sound propagation in the water column. The characterisation of these parameters allows for the assessment of operational limitations, maritime incident risk, and the representativeness of scenarios used in the environmental assessment.
- **Maritime Traffic and Maritime Space Use**: Seismic surveys temporarily occupy maritime space and involve vessels with restricted manoeuvring capability due to the towing of sources and streamers. Therefore, this component is necessary to assess collision risks, interference with navigation routes, interactions with fisheries, maritime communication needs, and conflict management measures.

Table 7-1: Requirements for Study of Climate, Oceanography and Maritime Traffic

Component	▪ Main Elements to Characterise
Offshore Climate	▪ Climatic classification of the Project's implementation area. ▪ Characterisation of precipitation and temperature and their respective seasonal variation. ▪ Wind regime: predominant directions, average and maximum speeds, and seasonal variability. ▪ Tropical cyclone risk: historical trajectories, frequency, seasonality, and operational relevance for offshore activities.
Oceanography	▪ Characterisation of marine currents. ▪ Characterisation of tides. ▪ Characterisation of swell and sea state. ▪ Bathymetric characterisation of the Project area. ▪ Identification of oceanographic constraints relevant to navigation and seismic operations.
Maritime Traffic and Maritime Space Use	▪ Characterisation of the institutional and regulatory framework applicable to maritime navigation in Mozambique. ▪ Identification of the main relevant maritime authorities and institutions. ▪ Identification of the main international conventions and practices applicable to maritime safety and collision prevention. ▪ Characterisation of international navigation routes in the Mozambique Channel. ▪ Characterisation of regional and coastal navigation routes along the Mozambican coast. ▪ Main support ports, vessel traffic, and operational relevance for the Project. ▪ Characterisation of existing maritime traffic in the Project's area of influence. ▪ Existing maritime activities, including artisanal fishing, semi-industrial and industrial fishing, and other relevant maritime activities. ▪ Identification of the main fishing activity zones and intensity of use. ▪ Identification of potential maritime space use conflicts. ▪ Interaction between different types of vessels, anchorage areas, exposure to illicit acts, and operational limitations associated with offshore environmental conditions.

The characterisation of the baseline situation should provide sufficient information to support the assessment of the seismic survey's impacts on maritime navigation, maritime safety, port activities, and fishing activities.

7.3.2 Marine Ecology and Biodiversity

The characterisation of the baseline situation of the marine biological environment should be based on an exhaustive review of available secondary information, including scientific literature, institutional databases, previous studies, and other biophysical information relevant to the marine and coastal environment potentially affected by the Project.

The study will focus on the following components:

- **Marine Biota:** This component is central because the main pathway for interaction of an offshore seismic survey with biodiversity results from underwater noise, the presence of vessels, and temporary operational disturbance. The identification of sensitive biological groups and species allows for the definition of relevant ecological receptors, interpretation of acoustic modelling results, and proposal of proportional mitigation and monitoring measures.
- **Marine and Coastal Habitats**: Although seismic acquisition occurs in an offshore environment and, as a rule, does not involve direct physical intervention on coastal habitats, these habitats can function as feeding, breeding, shelter, or connectivity areas for sensitive species. Their characterisation allows for the assessment of the spatial relationship between the operational area, protected areas, critical habitats, and zones of greatest ecological sensitivity.
- **Ecological Processes and Environmental Sensitivity:** The assessment of a seismic survey should not be limited to the presence or absence of species, but should also consider seasonal movements, migration, reproduction, feeding, ecological connectivity, and behaviour. This component allows for the identification of the most sensitive ecological periods, areas, and functions, supporting the assessment of impacts direct, indirect, and cumulative.
- **Limitations and Knowledge Gaps:** Available marine information may be heterogeneous, spatially incomplete, or based on surveys conducted in other periods. Explicit identification of gaps is necessary to avoid unsupported conclusions, define conservative assumptions, guide modelling, and indicate needs for confirmation, management, or monitoring.

Table 7-2: Requirements for the Marine Ecology and Biodiversity Study

Component	Main Elements to Characterise
Marine Biota	▪ Characterisation of the occurrence, distribution, ecology, and sensitivity of plankton. ▪ Characterisation of benthic communities. ▪ Characterisation of marine invertebrates, including crustaceans of ecological and fishing interest. ▪ Characterisation of fish and elasmobranchs. ▪ Characterisation of marine turtles. ▪ Characterisation of marine birds. ▪ Characterisation of marine mammals, including whales, dolphins, and dugongs. ▪ Identification of rare, threatened, protected, or endangered species. ▪ Identification of species of conservation importance. ▪ Identification of ecologically sensitive species. ▪ Identification of species potentially vulnerable to acoustic and operational disturbance associated with seismic activity.
Marine and Coastal Habitats	▪ Characterisation of beaches. ▪ Characterisation of mangroves. ▪ Characterisation of seagrass beds and other marine angiosperms. ▪ Characterisation of coral reefs. ▪ Characterisation of rocky shores. ▪ Characterisation of continental shelf habitats. ▪ Identification of other ecologically sensitive habitats. ▪ Spatial distribution of habitats. ▪ Ecological importance and ecological connectivity. ▪ Ecological sensitivity of habitats. ▪ Relevance for priority species. ▪ Identification and mapping of protected areas and buffer zones. ▪ Identification of Key Biodiversity Areas (KBAs). ▪ Identification of Important Marine Mammal Areas (IMMAs).

Component	Main Elements to Characterise
	▪ Identification of Important Shark and Ray Areas (ISRAs).
Ecological Processes and Environmental Sensitivity	▪ Ecological sensitivity of present habitats and species. ▪ Ecological dependencies relevant to priority receptors. ▪ Potential sensitivity of marine fauna to underwater noise. ▪ Identification of receptors susceptible to behavioural disturbance. ▪ Identification of habitats potentially vulnerable to acoustic propagation.
Limitations and Knowledge Gaps	▪ Identification of limitations of available data. ▪ Identification of relevant knowledge gaps. ▪ Identification of uncertainties associated with the distribution and ecology of receptors. ▪ Distinction between information supported by local/regional evidence and inferences based on international literature.

The description of the baseline situation shall be spatially explicit, whenever available data permit, and cover the Project area and its ecological area of influence.

7.3.3 Environment Socioeconomic (Including Fisheries and Tourism)

The characterisation of the socioeconomic and fisheries baseline situation shall cover the Project's area of influence, including coastal communities, relevant economic activity centres, maritime areas used by fishing activities, and other areas potentially affected directly or indirectly by offshore seismic survey activities.

The characterisation shall be based on the analysis of available secondary information, bibliographic and documentary review, official statistical information, institutional interviews, consultations with key stakeholders, field observations, and, when necessary, complementary primary data collection. The adopted methodology shall ensure consistency, verifiability, and triangulation of the information used.

The study shall focus on the following components:

- **Territorial Organisation, Administration and Governance:** This component allows for the identification of jurisdictions, authorities, and institutional mechanisms necessary for public consultation, operational communication, complaint management, and incident response. In an offshore project, coordination between environmental, maritime, fisheries, provincial, and district authorities is essential for effective management.
- **Population and Demography** Demographic characterisation allows for an understanding of the scale and distribution of coastal populations potentially affected, even indirectly, by temporary changes in maritime space use, by interactions with fisheries, or by the presence of supporting logistical activities.
- **Culture, Language, Religion and Sociocultural Aspects:** This component is relevant for ensuring adequate communication with communities and for identifying sociocultural values associated with the sea, fishing, traditional practices, or sensitive sites. It also helps to prevent social conflicts and adapt public participation to local languages and structures.
- **Education:** Education indicators help define appropriate forms of communication and information dissemination, including non-technical materials and public engagement strategies. They also allow for the assessment, where applicable, of opportunities and limitations associated with local capacity building or logistical support.
- **Health:** Public health is relevant for assessing the vulnerabilities of communities and workers, local response capacity, and potential risks associated with team mobilisation, interactions with logistical bases, or emergencies. The characterisation should be proportionate to the temporary and offshore nature of the Project.

- **Housing and Living Conditions:** This component helps to interpret the socioeconomic sensitivity of coastal communities and their resilience capacity in the face of temporary disturbances, especially when livelihoods depend on marine resources or vulnerable local economic chains.
- **Basic Services and Infrastructure:** Services and infrastructure influence logistics, communication, access to information, complaint response capacity, and the management of potential onshore interfaces. This information is also useful for assessing whether the Project may generate temporary pressure on local or port services.
- **Economic Activities and Livelihoods:** This component is essential for assessing potential temporary interferences with livelihoods, value chains, and coastal and maritime economic activities. In the case of offshore seismic acquisition, fishing and tourism require specific attention due to possible spatial or temporal overlap with operational areas, navigation routes, and zones of greater social sensitivity.
- **Vulnerable Groups and Social Sensitivity:** The identification of vulnerable groups ensures that mitigation, communication, and complaint management measures are inclusive and proportionate. This component is important to prevent impacts temporary or indirect from disproportionately affecting groups with lower adaptive capacity.
- **Fishing and Fishery Resources:** Fishing is one of the most relevant socio-economic components for offshore seismic projects, due to possible interaction with fishing grounds, vessel routes, temporary safety exclusions, and risk perception regarding fishery resources. Characterisation allows for the assessment of impacts on access, fishing effort, maritime safety, and potential use conflicts.

Table 7-3: Requirements of the Socio-economic, Fisheries and Tourism Environment Study

Component	Main Elements to Characterise
Territorial, Administrative Organisation and Governance	▪ Definition of the Direct Influence Area (DIA) and Indirect Influence Area (AII). ▪ Administrative framework of the influence area. ▪ Local governance structure. ▪ Relevant State bodies for the territory. ▪ Community authorities and traditional leaders. ▪ Local mechanisms for representation, consultation, and institutional coordination. ▪ Land tenure and community organisation aspects relevant to the Project.
Population and Demography	▪ Total population. ▪ Population density. ▪ Spatial distribution of the population. ▪ Age structure. ▪ Distribution by sex. ▪ Population growth. ▪ Household composition. ▪ Relevant demographic and sociodemographic indicators. ▪ Recent demographic trends.
Culture, Language, Religion and Sociocultural Aspects	▪ Predominant ethnolinguistic groups. ▪ Languages of local and institutional use. ▪ Predominant religious practices. ▪ Relevant cultural elements. ▪ Cultural manifestations with territorial expression. ▪ Sensitive cultural or symbolic places, practices, and values. ▪ Relevant tangible and intangible cultural heritage.
Education	▪ Structure of the education system. ▪ Network of educational establishments.

Component	Main Elements to Characterise
	▪ Available education levels. ▪ Literacy and illiteracy indicators. ▪ School attendance. ▪ Constraints on access, retention, and progression in education. ▪ Technical and vocational education, where relevant.
Health	▪ Existing health network. ▪ Distribution and typology of health units. ▪ General availability of health services. ▪ Relevant public health indicators. ▪ Available health human resources. ▪ Relevant epidemiological trends. ▪ Health vulnerabilities susceptible to influence by the Project.
Housing and Living Conditions	▪ Predominant types of housing. ▪ Construction materials. ▪ Possession of durable goods, where available. ▪ Household characteristics. ▪ General welfare and living conditions. ▪ Main social and housing vulnerabilities.
Basic Services and Infrastructure	▪ Access to energy. ▪ Water supply. ▪ Sanitation. ▪ Solid waste management. ▪ Road network and transport. ▪ Communications.
Economic Activities and Livelihoods	▪ Agriculture. ▪ Livestock. ▪ Artisanal, semi-industrial, and industrial fishing. ▪ Aquaculture. ▪ Formal and informal trade. ▪ Industry. ▪ Tourism. ▪ Employment and self-employment. ▪ Informal economy. ▪ Local value chains. ▪ Seasonality of activities. ▪ Community dependence on natural resources and areas of traditional use. ▪ Spatial distribution of economic activities. ▪ Support infrastructure. ▪ Vulnerabilities and potential land use conflicts.
Vulnerable Groups and Social Sensitivity	▪ Identification of potentially more vulnerable groups. ▪ Identification of groups potentially more exposed to impacts of the Project. ▪ Relevant socioeconomic vulnerability factors.
Fisheries and Fish Resources	▪ Characterisation of existing fish resources. ▪ Characterisation of artisanal, semi-industrial, industrial, and recreational fishing activities. ▪ Fishing seasons and seasonality. ▪ Fishing techniques used. ▪ Types of vessels and fishing equipment.

Component	Main Elements to Characterise
	▪ Number and composition of the fishing fleet. ▪ Number of registered fishermen. ▪ Location of main fishing grounds. ▪ Spatial distribution of fishing effort. ▪ Target fish species, including shrimp.

The study shall ensure consistent articulation with specialised studies on marine ecology, maritime traffic, public participation, and the assessment of impacts environmental and social, avoiding duplication and ensuring coherence between the different components of the EIA.

7.3.4 Underwater Acoustic Modelling

Although underwater acoustic modelling does not, in itself, constitute a component of the environmental baseline characterisation, it represents an essential base technical study for the assessment of the impacts associated with the seismic survey. This study will allow for the estimation of underwater noise propagation generated by seismic sources, identification of potential acoustic influence zones, and support the assessment of effects on sensitive receptors, including marine mammals, turtles, fish, elasmobranchs, and other relevant groups.

Acoustic modelling will thus provide indispensable quantitative information to support the assessment of impacts, define mitigation zones, support the selection of operational management measures, and reduce uncertainties in the EIA phase.

The study will focus on the following components:

- **Objective of Underwater Acoustic Modelling:** The clear definition of the modelling objective ensures that the study responds to the needs of the environmental assessment, namely estimating the acoustic influence area, supporting the significance assessment, and underpinning measures such as exclusion zones, soft start, visual monitoring, and, where applicable, PAM.
- **Methodological Framework and Technical Reference:** Modelling must be technically defensible and comparable with recognised practices for impulsive underwater noise. The methodological framework is necessary to justify assumptions, interpretation criteria, and adopted precautionary levels.
- **Baseline Information for Modelling:** The quality of the results depends directly on the quality of the input data. This component is essential for realistically representing the source, the operation geometry, water depth, seabed conditions, and the spatial relationship with ecological receptors and sensitive areas.
- **Propagation Modelling – Single Shot:** Single shot modelling allows understanding the instantaneous distribution of noise emitted by each seismic shot. It is necessary for estimating distances to reference levels, assessing immediate exposure risk, and supporting the definition of operational mitigation zones.
- **Accumulated Exposure Modelling:** A seismic survey involves repeated shots over time and space. Accumulated exposure is necessary to assess potential effects associated with the repetition of acoustic signals and to distinguish between peak levels and total exposure potentially relevant for different faunal groups.
- **Ecological Receptors and Impact Assessment:** Modelling is only environmentally useful if the results are related to specific ecological receptors. This component allows interpreting the predicted levels based on the sensitivity of species, auditory groups, protected areas, and ecological functions, avoiding a purely physical assessment of sound.

- **Preliminary Mitigation Framework:** The acoustic results must inform concrete and proportionate environmental management measures. This component allows establishing a direct link between the prediction of impacts and the operational measures to be included in the EIA and survey procedures.
- **Modelling Tools:** The selection of the tool influences the ability to represent the source, the medium, and the required outputs. The justification of the tool used is necessary to ensure transparency, reproducibility, and technical adequacy for the level of detail of the EIA.
- **Assumptions, Limitations, and Exclusions:** Acoustic modelling is a technical prediction and depends on assumptions. Explicitly stating limitations avoids undue interpretations, supports uncertainty assessment, and allows indicating which aspects should be confirmed during the implementation phase or through monitoring.

Table 7-4: Requirements for the Underwater Acoustic Modelling Study

Component	Main Elements to Consider
Objective of Underwater Acoustic Modelling	▪ Technical characterisation of the seismic sound source. ▪ Prediction of the acoustic field associated with the operation. ▪ Estimation of the spatial and temporal distribution of relevant sound levels. ▪ Identification of the main ecological receptors potentially exposed. ▪ Support for the assessment of potential ecological impacts associated with underwater noise. ▪ Support for the preliminary definition of distances, zones, and mitigation measures.
Methodological Framework and Technical Reference	▪ Application of recognised methodologies and international best practices for offshore seismic operations. ▪ Consideration of relevant references from IFC, JNCC, CBD and IOGP. ▪ Use, where applicable, of internationally recognised technical criteria for the interpretation of impulsive acoustic exposures. ▪ Approach proportional to the level of detail required for the EIA phase.
Baseline Information for Modelling	▪ Water depths, available bathymetry and source depth. ▪ Simplified seabed characteristics, where available. ▪ Ecological and territorial framework of the area and its surroundings. ▪ Identification of protected areas, sensitive areas and other environmental constraints. ▪ Block delimitation and location relative to the coast. ▪ Description of the seismic survey, including sequence, shot interval, line spacing, planned duration and percentage of time with the source active. ▪ Vessel and seismic source characteristics, including acquisition speed, total array volume, individual airgun volumes, firing pressure and tow depths. ▪ Geometric configuration of the equipment, ideally with x, y, z coordinates of the airguns relative to an array reference point.
Propagation Modelling – Single Shot	▪ Sound pressure level fields. ▪ Sound exposure level fields. ▪ Peak pressure fields. ▪ Distance-depth sections. ▪ Horizontal maps for selected depths. ▪ Isophones and reference distances. ▪ Isophones associated with relevant injury thresholds, where applicable.
Accumulated Exposure Modelling	▪ Selection of representative locations along transects. ▪ Consideration of potentially sensitive zones, including shallower areas, areas near marine protected areas and other critical receptors. ▪ Estimation of received levels over time. ▪ Estimation of accumulated sound exposure level.

Component	Main Elements to Consider
	▪ Estimation of peak sound pressure level.
Ecological Receptors and Impact Assessment	▪ Identification of marine protected areas and other ecologically sensitive sites. ▪ Assessment of the potential for exposure to levels likely to cause injury. ▪ Assessment of the potential for temporary auditory effects. ▪ Assessment of behavioural disturbance, including avoidance and displacement. ▪ Assessment of functional interference in ecologically relevant areas. ▪ Interpretation of results by species and auditory groups, where applicable. ▪ Support for defining mitigation distances proportional to risk.
Preliminary Mitigation Framework	▪ Definition of exclusion, precaution or mitigation zones. ▪ Definition of preliminary mitigation distances based on modelling results. ▪ Consideration of sensitive periods or areas.
Modelling Tools	▪ Use of specialised underwater acoustic propagation tools. ▪ Selection of the tool based on final survey data, source configuration and required technical products. ▪ Possible use of tools such as dBSea, Acoustics Toolbox or technically appropriate in-house solutions.
Assumptions, Limitations and Exclusions	▪ Explanation of the predictive nature of the modelling. ▪ Indication of dependence on the availability and quality of input data. ▪ Identification of methodological limitations and relevant uncertainties. ▪ Indication of the absence of field campaigns for validation, unless specifically contracted. ▪ Indication of the absence of specific acquisition of oceanographic or ecological data, unless defined later. ▪ Indication of the absence of a detailed operational monitoring plan, except for a preliminary framework. ▪ Indication of the absence of continued support for the implementation of measures during the campaign, unless supplementary contracting is arranged.

7.3.5 Archaeology and Cultural Heritage

The study of archaeology and cultural heritage should consider material and immaterial cultural heritage potentially related to the marine and coastal environment, including underwater heritage, shipwrecks, known or potential archaeological sites, as well as cultural values associated with coastal communities and the traditional use of marine resources.

In the case of an offshore seismic acquisition campaign, the risk of direct physical impact on underwater cultural heritage is, in principle, limited by the nature of the activity, as seismic equipment is towed in the water column and no direct intervention on the seabed is foreseen. However, this conclusion must be confirmed in light of the operational design, routes, potential use of logistical bases, anchoring procedures, or accidental situations. For this reason, heritage characterisation and assessment must be proportionate to the risk, but robust enough to identify sensitive receptors and define prevention and response procedures.

The study will focus on the following components:

- **Documentary, cartographic and institutional research:** Offshore heritage information is often dispersed or incomplete. Documentary and institutional research is essential to identify known sites, areas of archaeological potential, and constraints that may require safeguarding or exclusion measures in advance.
- **Underwater cultural heritage and maritime archaeology:** This component is relevant because the maritime space may contain archaeological remains associated with historical navigation, shipwrecks,

and other submerged cultural assets. Even when seismic activity does not involve direct contact with the seabed, identifying these receptors helps confirm the level of risk and prevent damage associated with manoeuvres, anchoring, support operations, or accidental situations.

- **Coastal, intangible and community cultural heritage:** Heritage assessment should not be limited to material archaeological sites. In coastal communities, the sea may be associated with cultural practices, local identities, symbolic places, and traditional knowledge. This information allows for the adaptation of public participation and avoids indirect impacts or perceptions of cultural disrespect.
- **Consultation with authorities, communities and key stakeholders:** Some heritage knowledge may not be formally registered in databases. Consultation with authorities and communities allows for the supplementation of desk research, reduction of information gaps, and integration of local knowledge relevant to the Project's assessment and management.
- **Assessment of impacts and prevention measures:** This component ensures that the information gathered is translated into practical management measures. The assessment must confirm whether plausible impact pathways exist and, where necessary, establish avoidance, safeguarding, or control measures compatible with offshore operations.
- **Accidental discovery procedures:** Even with prior research, unidentified cultural assets may exist. Accidental discovery procedures are necessary to ensure an immediate, proportionate, and legally appropriate response, preventing irreversible damage and ensuring communication with the competent authorities.
- **Monitoring, reporting and knowledge limitations:** The monitoring and reporting component allows for verification of the implementation of safeguard measures and response to unforeseen situations. The clarification of gaps is particularly important in an offshore context, where archaeological information may be limited and not always validated by specific surveys.

Table 7-5: Requirements of the Study of Archaeology and Cultural Heritage

Component	Main Elements to Consider
Documentary, cartographic, and institutional research	▪ Desk research in national archives, institutional databases, and cartographic sources to identify and map known or potential cultural heritage. ▪ Consultation of information on underwater archaeological sites, shipwrecks, historical navigation routes, and coastal areas with cultural relevance. ▪ Review of existing information in previous studies, spatial plans, nautical charts, and records from competent authorities.
Underwater cultural heritage and maritime archaeology	▪ Identification and location of known or potential shipwrecks. ▪ Identification of underwater archaeological sites or areas with archaeological potential. ▪ Preliminary characterisation of the nature, location, state of knowledge, and potential significance of the identified assets. ▪ Spatial representation of known or potential heritage receptors, whenever data permits.
Coastal, intangible, and community cultural heritage	▪ Identification of material and intangible cultural values linked to the sea, fishing, traditional navigation, or community practices. ▪ Identification of sensitive cultural sites, practices, narratives, or values related to marine resources or coastal communities. ▪ Characterisation of the relationship between coastal communities, traditional uses of the sea, and any culturally relevant areas.
Consultation with authorities, communities, and key stakeholders	▪ Consultation, where relevant, with competent authorities, cultural institutions, maritime authorities, and local communities. ▪ Collection of local information on known finds, shipwrecks, culturally sensitive sites, or areas of traditional use. ▪ Validation, whenever possible, of documentary information with institutional and community knowledge.

Component	Main Elements to Consider
Procedures for fortuitous finds	▪ Establishment of protocols for unexpected finds during activities. ▪ Definition of procedures for interrupting or adjusting activities when unforeseen cultural assets are identified. ▪ Definition of mechanisms for immediate notification to competent authorities. ▪ Definition of responsibilities, records, and reporting within the scope of the PGA.
Monitoring, reporting, and knowledge limitations	▪ Definition of monitoring measures applicable during the seismic campaign, when justified by the level of risk. ▪ Recording and reporting of occurrences, non-conformities, or finds related to cultural heritage. ▪ Identification of information gaps and uncertainties associated with marine and coastal cultural heritage. ▪ Indication of potential needs for further investigation if sensitive heritage receptors are identified.

The study of archaeology and cultural heritage should be developed proportionally to the Project's risk, but maintaining the capacity to identify known or potential underwater heritage, relevant coastal cultural values, and adequate prevention, response, and reporting procedures.

7.4 Environmental Impact Assessment Methodology

7.4.1 Objective

This chapter establishes the methodology to be applied in the assessment of environmental and social impacts associated with the 3D Marine seismic acquisition project. It defines the principles, criteria, classification scales, and procedures to be observed by the EIA multidisciplinary team, ensuring a systematic, traceable, and technically defensible approach before the competent national authorities, international funders, and independent technical review.

The methodology has been designed for a non-intrusive offshore seabed activity, without drilling, where the main source of environmental pressure is the emission of acoustic pulses by a compressed air source associated with the seismic vessel and its support means, covering the mobilisation, acquisition/operation, and demobilisation phases. The chapter is standalone within the EIA Terms of Reference, being applicable transversally to all environmental and socioeconomic components assessed.

7.5 Principles

The impact assessment observes the following structuring principles:

- Prevention and precaution, prioritising avoidance at source over mitigation and compensation.
- Mitigation hierarchy, in the sequence avoid, minimise, restore, and compensate.
- Proportionality of analytical effort relative to receptor sensitivity and the expected magnitude of interactions.
- Traceability, with explicit statement of assumptions, information sources, expert judgment, and confidence level.
- National regulatory compliance and alignment with international best practices applicable to offshore seismic acquisition.

  Integration of project phases and different receptors into a consistent matrix, avoiding fragmentation of the analysis.

Articulation with public participation, ensuring that legitimate concerns of stakeholders and affected parties are considered in the identification and assessment of impacts.

7.6 Identification of Activities and Receptors

The identification of potential impacts results from the systematic cross-referencing between project activities, organised by phase, and the environmental and social receptors relevant to the offshore environment. The phases considered are:

- Mobilisation, including transit of the seismic vessel and support means to the operational area, equipment installation and testing, and liaison with competent maritime authorities.
- Acquisition/operation, including the activation of the sound source along the survey lines, towing of streamers, manoeuvres of the seismic vessel and support and patrol boats, and production of waste and effluents under MARPOL.
- Demobilisation, including equipment retrieval, transit back and release of the area for other uses.

The main receptors to consider are summarised in the Table 7-6

Table 7-6: Main receptors to consider in the assessment

Component	Typical receptors to consider in the assessment
Physical environment	Water column and water quality; seabed sediments; underwater acoustic environment; marine atmospheric air quality; oceanography (currents, waves, tides); meteorology.
Biological environment	Marine mammals (cetaceans and sirenians); sea turtles; pelagic and demersal fish and their early stages (eggs and larvae); plankton; seabirds; sharks and rays; benthic communities; sensitive habitats and legally protected areas; marine biodiversity in a broad sense.
Socio-economic environment	Artisanal and industrial fishing; commercial navigation and maritime safety; other uses of the maritime space; coastal communities dependent on the sea; underwater cultural heritage; potential conflicts of use between operators.

7.7 Typologies of Impacts

The impacts will be classified according to the typologies indicated in the Table 7-7, considering that the same event or pressure can give rise, simultaneously, to impacts of more than one typology.

Table 7-7: Typologies of impact considered

Typology	Definition (adapted to the context of offshore seismic acquisition)
Direct	Results from the direct interaction between a project activity and the receiving environment (e.g., emission of acoustic pulses by the compressed air source and behavioural disturbance of marine mammals).
Indirect	Arises from secondary processes induced by the activity or from subsequent interactions between direct impacts and the environment (e.g., temporary displacement of fish shoals leading to restrictions on fishing activity in adjacent areas).
Cumulative	Acts in combination with existing, planned or predictable pressures on the same receptors or resources (e.g., additional acoustic contribution within a context of intense maritime traffic or other geophysical surveys in the region).

Typology	Definition (adapted to the context of offshore seismic acquisition)
Transboundary	Extends beyond national jurisdictional waters, particularly through long-distance acoustic propagation and the movement of migratory species shared with neighbouring oceanic States.
Perceived	Alteration attributed to the project by stakeholders, even when the causal relationship is not technically established; identified and addressed through the public participation process and the complaints management mechanism.
Accidental	Arises from unplanned events, including spills, collisions with fauna or other vessels, loss of seismic equipment, damage to fishing gear, fire on board, and unauthorised discharges.

For all impacts, their nature is also recorded, classified as negative (environmental or social cost), positive (benefit), or neutral, with most potential impacts associated with an offshore seismic acquisition operation being predictably negative in nature, although typically temporary and reversible.

7.8 Evaluation Criteria and Scales

The assessment of the significance of impacts is based on three primary criteria — extent, intensity, and duration — which, combined, determine the consequence. Probability of occurrence is then associated with the consequence, generating the overall significance of the impacto. The criteria and their respective scales are systematised in the Table 7-8.

The definition of duration has been adapted to the context of offshore seismic acquisition, explicitly contemplating the possibility of short-term temporary and reversible impacts — consistent with the cessation of acoustic emissions and the completion of operations — without prejudice to the identification of any medium and long-term effects, whenever technically justifiable.

Table 7-8: Criteria used in the determination of impact magnitude

Classification	Definition of classification	Score
A. *Extent* – *spatial extent where the impact is felt*		
Local	Restricted to the direct operational area (acquisitionpolygon , seismic vessel and immediate adjacent areas, including the mitigation zone of minimum 500 m).	1
Regional	Extends to the surrounding marine survey and domain area, including shelf and slope, potentially encompassing regional marine ecosystems and uses.	2
(Inter)national	Reaches the entirety of the national Exclusive Economic Zone or produces transboundary effects, including shared resources and migratory populations.	3
B. *Intensity* – *the magnitude of the change imposed on the receptor*		
Low	The physical, biological, or socioeconomic processes of the receptor undergo marginal alteration, remaining substantially unchanged.	1
Medium	The receptor's processes are maintained, albeit in a modified form, with perceptible alteration of its functions, behaviour, or availability.	2
High	The receptor's processes are severely altered, with substantial modification of its functions, abundance, distribution, or use.	3
C. *Duration* – *the temporal framework during which the impact é is felt*		
Short-term	Limited to the duration of seismic operations and the mobilisation/demobilisation period, including effects that are immediately reversible after cessation of acoustic emissions.	1
Medium-term	Persists beyond the operational period, lasting between a few months and approximately five years, or until functional restoration of the receptor.	2

Classification	Definition of classification	Score
Long-term	Persists for a period exceeding five years or produces functionally irreversible changes in the receptor.	3

7.9 Determination of Consequence

The consequence results from the sum of the scores assigned to scope, intensity, and duration, with the combined score being converted into a qualitative classification, as presented in Table 7-9. The minimum possible combined score is 3 and the maximum is 9.

Table 7-9: Method used to determine the consequence score

Combined score (A+B+C)	3 – 4	5	6	7	8 – 9
Consequence classification	Very low	Low	Medium	High	Very high

7.10 Probability

Probability translates the likelihood of the impacto occurring during the project lifecycle, being classified according to Table 7-10. Its assignment is based on experience from analogous operations, documented evidence, and reasoned expert judgment.

Table 7-10: Probability classification

Impact probability – probability of the impact occurring	
Unlikely	Less than 40% probability of occurrence during the project lifecycle.
Possible	Between 40% and 70% probability of occurrence.
Probable	Greater than 70% and up to 90% probability of occurrence.
Definite	Greater than 90% probability of occurrence, including systematic events associated with operations.

7.11 Impact Significance Matrix

Overall significance is obtained by crossing consequence with probability, according to Table 7-11. The absence of a statutory definition for the concept of significance implies a component of expert judgment, and any assignment must be technically justified and referred to the adopted regulatory criteria and benchmarks and best practices.

Table 7-11: Impact significance classification

Consequence \ Probability	Unlikely	Possible	Likely	Definitive
Very low	Insignificant	Insignificant	Very low	Very low
Reduced	Very low	Very low	Low	Low
Medium	Low	Low	Medium	Medium
High	Medium	Medium	High	High
Very high	High	High	Very high	Very high

The determination of significance also considers the following elements:

- Compliance with Mozambican environmental legislation, applicable sectoral standards and guidelines, and recognised international best practices for offshore seismic surveys.
- Magnitude and quantitative expression, whenever practicable, of the induced changes in the physical and biological environment (e.g., sound levels estimated by acoustic modelling, exclusion zones and mitigation zones).
- Sensitivity, importance, and recovery capacity of receptors, including their protection status and regional, national, or international ecological relevance.
- For human receptors, the sensitivity of the affected household, community, or socioeconomic group and their capacity to adapt to and manage change, with particular attention to the fishing sector.
- Probability of impact, supported by previous experience in comparable offshore seismic operations.

7.12 Residual significance and mitigation

Each impact will be assessed in two sequential iterations: the first, without the application of mitigation measures, reflects the intrinsic significance of the interaction; the second, considering the planned mitigation measures, reflects the residual significance. The definition of measures is proportional to the identified significance, as indicated in table 7-12

Table 7-12: Definition of impact significance and implications for mitigation

Significance	Implications for management and mitigation
Insignificant	The potential impact is negligible; no additional measures are required beyond the normal conditions of good operational practice described.
Very low / Low	Compliance with international best practices applicable to offshore seismic acquisition (e.g., IOGP, JNCC, MARPOL) is sufficient, without the need for relevant specific additional measures, beyond those defined.
Medium	Specific mitigation measures are defined to reduce the impact to an acceptable level. Where mitigation is not technically feasible, compensatory measures should be considered.o to an acceptable level. Where mitigation is not technically feasible, compensatory measures should be considered.
High	Specific and robust mitigation measures are required, with associated monitoring and demonstration of effectiveness. Operational options (route, timing, source configuration) may need to be reviewed.
Very high	Mitigation measures must be implemented to reduce the impactoto acceptable levels. If this is not possible, the residual impact must be considered in the decision-making process for project viability and in the licensing conditions.

7.13 Mitigation Measures

7.13.1 General Approach and Mitigation Hierarchy

The EIA shall apply the mitigation hierarchy and develop measures compatible with the actual operation of an offshore seismic campaign. The measures shall be specific, auditable, and converted into operational obligations in the PGA.

Mitigation / enhancement is a critical phase of the EIA process: when potential impacts are identified, the objective is to avoid or minimise negative aspects as far as is reasonably practicable, while enhancing those that are positive.

Each recommended mitigation measure will be described in detail and the degree of mitigation possible will be identified. The EIA will also assess whether residual impacts, beneficial or adverse, continue after mitigation. As mitigation measures may involve both technical-level details and cost implications, these will be discussed and agreed with the proponent before the recommendations are finalised. It will be important to clearly link mitigation measures to significant environmental and social impacts, in order to ensure they are developed in close collaboration with technical service providers. Furthermore, it is important to ensure that the measures are practical, economical, culturally appropriate, and achieve their objectives.

Appropriate individual or integrated impact mitigation measures will be developed during the design phase, through continuous interaction between the engineering design process and the identification / assessment / mitigation / monitoring sequence in the EIA process.

The basic principle of mitigation is, first and foremost, to avoid any negative impact, rather than trying to remedy its negative effects later. When impacts cannot be avoided, the objective will be to reduce them to an acceptable level so that there are no substantial / critical residual impacts.

The mitigation hierarchy, based on an exhaustive impact assessment, is the basis for developing mitigation options. The EIA will identify the remaining residual impacts after mitigation, assess how significant they are, and demonstrate that they are acceptable. Residual and unavoidable impacts caused by the company's operations may be compensated by offsetting measures.

The systematic identification of appropriate mitigation measures is carried out following the hierarchy criteria defined in table 7-13.

Table 7-13: Mitigation Measures Hierarchy

Mitigation Criteria Hierarchy	Actions
Avoid at source	Reformulate the project to eliminate the potential impact associated with project activities.
Minimisation	Design control systems and implement measures to reduce impacts.
Reduce in situ	Implement off-site measures to reduce those impacts that cannot be eliminated by end-of-pipe treatments.
End-of-pipe	Remediate all unavoidable residual damage to the natural and human environment through restoration activities or appropriate interventions
Reduce off-site	Offset unavoidable residual impacts when other mitigation measures are not feasible, rational, or have already been fully implemented
Remediation	Make a positive contribution to biodiversity conservation and/or ecosystem service improvement and community development

Mitigation measures may also include initiatives to improve the situation of the environment or communities. For success, any mitigation measures identified "on paper" must be translated into appropriate, correctly targeted actions and implemented at the right time.

7.13.2 Principles of Mitigation to be Developed in the EIA

- Avoid, wherever possible, areas and periods of greatest environmental or social sensitivity;
- Minimise acoustic exposure through planning, soft-start, exclusion zones, OMM, PAM and shutdown where applicable;

- Minimise conflicts with fishing and navigation through warnings, coordination, guard vessels, liaison officers, and incident mechanisms;
- Prevent pollution from vessels through waste management, effluents, fuel, maintenance, and spill response;
- Ensure reporting, auditing, data logging, and adaptive management capability during the campaign;
- Ensure compensatory measures are only considered when there is significant residual impact, verified damage, or legal obligation, with transparent eligibility and causality criteria.

7.14 Environmental Management Plan

After identifying the necessary mitigation, it is essential that mechanisms exist to ensure that the recommendations and mitigation/optimisation measures identified in the EIA are implemented fully and effectively during all project phases. One of the main focuses of the EIA should be the compilation of a comprehensive Environmental Management Plan.

The main objective of the EMP is to ensure that the mitigation and improvement measures recommended in the EIA report or other relevant reports are effectively implemented and to ensure that any unforeseen and unidentified impacts are detected and resolved. The objectives of the EMP include:

- Facilitate the implementation of relevant mitigation measures resulting from the EIA, as well as any other conditions imposed by the MAAP, as the environmental authority, on the environmental licence;
- Emphasise environmental management and implementation requirements throughout the project lifecycle;
- Outline a system for dealing with non-compliance that ensures accountability, reporting, and resolution of any non-compliance;
- Encourage and achieve the best environmental and response performance from all employees and service providers;
- Ensure that management efforts are proactive and focused on preventing the occurrence of impacts;
- Complement the proactive approach with reactive measures to minimise the severity or significance of any impacts that cannot be avoided at source.

The EMP, through formal documentation on environmental management measures and commitments, plays a fundamental role in ensuring that potential negative impacts are minimised and positive ones are maximised. The EMP is therefore a tool that guides the management and monitoring of impacts.

These objectives will be achieved through the definition of measures and actions in accordance with the general directives presented in the Table 7-14

Table 7-14: General EMP Guidelines

General EMP Guidelines	Objectives
Prevention and Mitigation	is based on the principle of prevention, indicating actions and measures for control and minimisation of mitigable negative environmental impacts, which can be avoided, reduced, or controlled.
Corrective	encompass activities understood as necessary to fill and correct environmental impacts considered reversible, through actions of recovery and recomposition of satisfactory and acceptable environmental conditions.
Monitoring	aim at the adoption of systematised programmes for follow-up and recording over time of both the environmental evolution of the medium and the occurrence and

General EMP Guidelines	Objectives
	intensity of impacts and the state of the affected environmental components, taking into account the minimisation measures implemented in the meantime.
Compensatory	are intended for environmental impacts assessed as negative whose occurrence cannot be avoided or mitigated
Environmental Management Plans	aims to integrate and jointly analyse the proposed programmes, in order to promote continuous monitoring of the results of the practical implementation of all planned environmental actions, as well as to keep the environmental authority informed. The main issues to be addressed include water quality, noise, waste management, pollution incident control, occupational health and safety, community liaison, among others.

The Environmental Management Plan (EMP) to be developed during the EIA phase should translate the identified mitigation measures into clear, verifiable, and applicable operational procedures during the mobilisation, operation, and demobilisation of the seismic survey. For this purpose, the EMP should integrate specific management programmes, aligned with the offshore nature of the Project, the main identified environmental and social risks, and the coordination requirements with maritime authorities, the fishing sector, port operators, and other users of the maritime space.

A Table 7-15 presents the minimum recommended content for the main programmes that should integrate the EMP, without prejudice to the respective detail being adjusted according to the results of the impact assessment, underwater acoustic modelling, maritime traffic characterisation, fisheries analysis, and contributions from the public participation process.

Table 7-15: Minimum EMP Content

EMP Programme	Minimum Content
Underwater Noise and Marine Fauna Management Plan	Exclusion/monitoring zones; OMM; PAM; soft-start; shutdown; night-time and low-visibility requirements; registration forms; final reporting.
Maritime Navigation Management Plan	Safety zones; notices to mariners; VHF communication; routes; guard vessels; coordination with INAMAR/CEFMAR/ports; non-AIS traffic management.
Fisheries Communication and Interaction Plan	Stakeholder mapping; notice calendar; liaison officers; materials in appropriate languages; fishing gear procedure; incident registration and resolution.
Waste, Effluent, and Hazardous Substances Management Plan	Inventory; segregation; storage; transport; delivery to licensed port; effluents; oily waters; MARPOL records; audit.
Spill Prevention and Response Plan	Scenarios; equipment; responsibilities; notification chain; port/maritime coordination; drills; registration and reporting.
Environmental Monitoring and Reporting Plan	Indicators, frequency, responsibilities, reporting formats, audits, non-conformities, corrective actions, and lessons learned.
Complaints Management Mechanism	Reception channels; response times; investigation; registration; escalation; closure; reporting to authorities.

7.15 Process of Public Participation

The Public Participation Process (PPP) will be developed as an integral part of the Environmental Impact Assessment (EIA) process, in accordance with the Regulation on the Environmental Impact Assessment Process, approved by Decree No. 54/2015, of 31 December, and with the General Directive for the Public Participation Process in the EIA Process, approved by Ministerial Diploma No. 130/2006, of 19 July. For projects subject to EIA, public consultation should occur during the scoping/EPDA and EIA preparation/review phases, ensuring that Interested and Affected Parties (IAPs) have an effective opportunity to learn about the Project, understand its potential impacts, raise concerns, and contribute to the definition of studies, mitigation measures, and management plans.

The proposed methodology also takes into consideration the experience of public consultation processes carried out in comparable offshore seismic projects in Mozambique, in which practices such as the identification of stakeholders and affected parties (PI&A) at central, provincial, and district levels, the availability of the EPDA and the Non-Technical Summary, dissemination through newspapers and radio, the holding of public meetings, the collection of comments, and the preparation of detailed minutes were adopted. The process should, however, reinforce information accessibility and effective coverage of directly affected groups, particularly fishermen, Community Fishing Councils, tour operators, maritime authorities, conservation institutions, civil society organisations, and maritime space users.

7.15.1 Public Consultation Objectives

The PPP will have as main objectives to ensure clear and timely dissemination of information about the Project, collect concerns, comments, and recommendations from PI&A, identify relevant environmental and social issues, and ensure that the contributions received are recorded, analysed, and responded to transparently.

Specifically, the process should allow in the EIA phase:

- to present the results of the specialised studies carried out, including the characterisation of the baseline situation, underwater acoustic modelling, fisheries analysis, maritime traffic, marine ecology, and the socioeconomic environment;
- to present the environmental and social impacts identified, their significance, and the assumptions used in the assessment;
- to present the alternatives considered, including spatial, temporal, and operational alternatives, where applicable;
- to present the proposed mitigation, management, and monitoring measures for the mobilisation, operation, and demobilisation phases;
- to present the environmental management plan and associated specific plans, namely those relating to marine fauna and underwater noise, fisheries, maritime navigation, waste, spill prevention and response, communication, and complaints management;
- to verify whether the concerns raised in the EPDA phase were adequately considered in the EIA;
- to collect comments from PI&A on the robustness of the studies, the adequacy of the proposed measures, and the acceptability of residual impacts;
- to identify any additional concerns that should be integrated before the final submission of the EIA;
- to clarify the operational communication mechanisms, incident reporting, complaints management, and coordination with maritime authorities, the fishing sector, and coastal communities;
- to reinforce the transparency of the decision-making process, allowing PI&A to understand the EIA conclusions and how their contributions were considered.

7.15.2 Identification and Mapping of Stakeholders and Affected Parties

A database of IP&As will be prepared and updated throughout the EIA process. The identification of IP&As should consider the direct and indirect influence area of the Project, including potentially affected coastal communities, maritime space users, regulatory bodies, civil society organisations, economic operators, and technical and scientific institutions. PI&A should include, at least:

- National, provincial, and local environmental authorities;
- INP and other entities in the oil and gas sector;
- Maritime, hydrographic, and port authorities;

- Entities in the fisheries sector, sectoral institutes, fishermen's associations, community fishing councils, and fishing centres;
- District, municipal, and community authorities;
- Tour operators and tourism sector associations;
- Conservation area management entities and marine conservation institutions;
- Civil society organisations, environmental NGOs, and community associations;
- Academic and research institutions;
- Shipowners, port operators, shipping companies and other maritime space users;
- Vulnerable or potentially more exposed groups, including fishermen, women involved in the fishing value chain, young people, the elderly and households dependent on marine resources.

The approach should recognise that, in offshore seismic projects, not all affected parties reside near the operational area, but may depend on the maritime space for economic, cultural, recreational or institutional reasons. Therefore, mapping should cover both the coastal zone adjacent, as well as decision-making centres, ports, navigation routes, fishing areas and relevant conservation areas.

7.15.3 Locations for Public Consultation Meetings

The locations for public consultation meetings will prioritise administrative and coastal centres that ensure institutional representativeness, accessibility for IP&As and adequate coverage of the main maritime space users potentially influenced by the Project. This approach is compatible with the offshore nature of the activity, as the Project does not involve the installation of onshore infrastructure, physical resettlement or direct occupation of terrestrial community areas, but may generate temporary interactions with maritime activities, particularly fishing, navigation, coastal-marine tourism and biodiversity conservation.

The selection of locations will take into account the Project's area of influence, the distribution of the main interest groups and the location of institutions with relevant competencies for environmental management, fisheries, maritime navigation, maritime safety, conservation areas and coastal economic activities. Therefore, holding meetings in relevant provincial and/or district coastal centres allows for the efficient concentration of government representatives, maritime authorities, Community Fishing Councils, fishermen's associations, tour operators, civil society organisations, research institutions and other maritime space users.

This methodology is consistent with practices adopted in comparable public consultation processes for offshore seismic projects in Mozambique, in which meetings were held in district headquarters and the provincial capital, supplemented by the availability of documents in public institutions and the participation of relevant environmental, maritime and sectoral entities.

In the present project, it is proposed to hold meetings in the districts of Inhassoro, Vilankulo and Massinga and in the City of Inhambane, with documents to be made available, among other locations, in Maputo and in provincial and district institutions of Inhambane.

The choice to hold meetings in selected locations, rather than in all coastal districts potentially covered by the indirect area of influence, is technically defensible by being supplemented by adequate dissemination, invitation and feedback mechanisms. Legislation and good public participation practices require that IP&As have effective opportunity to access information and submit comments, but do not mandate that all coastal settlements be subject to a face-to-face meeting. The General Directive for Public Participation establishes the need to identify IP&As, record the issues raised, present responses to them and systematise the resolutions and commitments made.

In this context, the planned locations should be understood as main public consultation points, and should be supplemented by: dissemination through national, provincial and local media; making documents available in accessible locations; sending invitations to key entities; using non-technical summaries; receiving written comments; and, where necessary, holding thematic meetings or targeted interviews with specific groups, namely fishermen, maritime authorities, tour operators and conservation entities. This approach ensures the comprehensiveness and proportionality of the process, while keeping public consultation operationally viable and technically appropriate for the offshore and temporary nature of the seismic survey.

8 CONCLUSION

This Environmental Pre-Feasibility and Scoping Study (EPDA) was prepared within the scope of the Environmental Impact Assessment (EIA) process for the 3D Marine Seismic Acquisition Project in areas AS7 and AS8, promoted by SLB, in an offshore environment, off the coast of the provinces of Sofala and Inhambane. The intervention areas correspond to areas AS7 and AS8, with indicative surface areas of approximately 50,532.375 km² and 18,706.259 km², respectively, grouped into a single seismic acquisition area of approximately 71 304 km².

In accordance with Decree No. 54/2015, of 31 December, the main purpose of the EPDA is to determine the potential existence of fatal flaws associated with the implementation of the activity and, if none are identified, to define the scope and Terms of Reference for the EIA. Ministerial Diploma No. 129/2006 also establishes that the conclusions must summarise the main impacts, mitigation measures, knowledge gaps, monitoring requirements and recommendations regarding environmental feasibility, in conjunction with the Environmental Management Plan.

The conclusions presented in this chapter reflect the preliminary nature of the EPDA phase. Therefore, they do not constitute a final assessment of the significance of the impacts, but rather a technical summary of the main sensitivities identified, the issues requiring further investigation in the EIA, and the preliminary environmental feasibility assessment of the Project.

Nature and Justification of the Project

The Project falls within the exploration phase of the oil and gas operations lifecycle, limited to the acquisition of 3D seismic data in a marine environment. This Project does not include exploratory drilling activities, installation of subsea infrastructure, field development, hydrocarbon production, or direct physical interventions on the seabed.

The proposed seismic acquisition aims to improve the geological and structural knowledge of the sub-seabed, reduce uncertainties regarding the hydrocarbon potential of Mozambique's offshore sedimentary basins, and support future planning, licensing, and investment decisions in the sector. The activity is therefore temporary, mobile, and reversible in nature, and differs in nature and magnitude from subsequent phases of hydrocarbon exploration or production.

The delimitation of the acquisition area was subject to technical and environmental optimisation, including the reduction of the area to be surveyed in AS8 in the vicinity of the coastal zone and the adoption of an approximate exclusion zone of 15 km in relation to environmentally sensitive areas, including protected areas and critical habitats. This option constitutes a relevant preventive measure, aimed at reducing the exposure of sensitive receptors and minimising potential conflicts with existing uses of the marine space.

Environmental and Social Sensitivities

The preliminary characterisation of the reference situation allowed the identification of a set of biophysical, socioeconomic, and cultural receptors that justify detailed assessment in the EIA phase. The acquisition area is located entirely in an offshore environment, not overlapping with terrestrial areas, islands, or coastal-marine conservation areas. However, its location in the Mozambique Channel, in a context of high regional ecological importance, requires a technically robust assessment of the interaction between seismic operations and sensitive marine receptors.

In the field of biodiversity, relevant receptors include marine mammals, sea turtles, dugongs in adjacent coastal areas, pelagic species, elasmobranchs, fish, and other marine organisms potentially sensitive to underwater noise. The relative proximity of the area to Bazaruto Archipelago National Park, the Cape of São Sebastião Total Protection Zone, to the Great Bazaruto KBA and relevant coastal habitats reinforces the

need for a detailed spatial and seasonal analysis in the EIA. The EPDA concludes, however, that the operational area does not directly overlap with formally established conservation areas.

In the socioeconomic domain, the main sensitivities relate to the use of maritime space by artisanal, semi-industrial, and industrial fishing activities, recreational and sport fishing, commercial navigation, tourism marine and coastal support activities. Although not operating in the project area, artisanal fishing and subsistence activities in adjacent coastal zones are of particular relevance, not only economically but also socially and for food security, and their characterisation should be deepened in the EIA.

Maritime navigation also constitutes a critical component, as the operation of a seismic vessel towing cables of significant length (~8km) implies limited manoeuvring capacity, the need for safety zones, permanent communication with other sea users, and coordination with the competent maritime authorities. Liaison with INAMAR, port authorities, CEFMAR, ADNAP, provincial fisheries sector entities, and sea user representatives will be essential to reduce risks of collision, operational interference, and use conflicts.

Potential Impacts and Fatal Flaws

The preliminary identification of potential impacts was carried out based on the conceptual description of the Project, available knowledge about the receptor environment, the technical team's professional experience, and good international practices applicable to offshore seismic operations. The mobilisation, operation, and demobilisation phases were considered, as well as impacts that are direct, indirect, cumulative, accidental, temporary, and reversible, including interactions with fishing, navigation, other uses of maritime space, and sensitive ecological receptors.

The main potential impacts identified at this stage include: temporary behavioural disturbance of sensitive marine fauna due to underwater noise; risk of temporary alteration of distribution patterns or habitat use by marine mammals, turtles, and fish; temporary interference with fishing and navigation activities; risk of collision or excessive approach between vessels; risk of damage to or entanglement of fishing gear; generation of waste and effluents on board; risk of accidental spills; and risks associated with extreme weather events.

Based on the information currently available, no evidence of fatal environmental or social flaws that would preclude the Project's implementation at the outset has been identified. This conclusion is, however, preliminary and conditional on the confirmation, in the EIA phase, of the magnitude of the impacts acoustic, spatial and seasonal distribution of sensitive receptors, intensity of interactions with fisheries and navigation, assessment of accidental risks, and results of the public participation process.

The presence of protected or threatened species in the area of influence, as well as proximity to areas of high ecological sensitivity, does not, in itself, constitute a fatal flaw at this stage. However, it constitutes a relevant sensitivity condition, which requires the application of a precautionary approach, underwater acoustic modelling, robust operational measures, and the definition of an adequate Environmental Management Plan.

Underwater Noise and Marine Fauna

Underwater noise constitutes the main pathway of interaction between the proposed activity and marine biodiversity. The seismic source, composed of airguns, generates repeated acoustic impulses, whose impact potential depends on the source configuration, operating depth, frequency, directivity, bathymetry, oceanographic conditions, receptor sensitivity, and exposure duration.

The EPDA concludes that this component should be evaluated in detail in the EIA through underwater acoustic modelling, including characterisation of the sound source, acoustic propagation, received level maps, assessment of disturbance and injury thresholds, cumulative exposure analysis, and identification of

suitable mitigation zones. The modelling results should be integrated into the marine ecology and fisheries assessment and the definition of the EMP.

The preliminary mitigation measures identified, to be developed and confirmed in the EIA, include exclusion and monitoring zones, marine mammal observers, passive acoustic monitoring where applicable, pre-shot search, soft-start, shutdown in case of presence of sensitive species in the mitigation zone, recording and reporting requirements, and operational adaptation based on visibility conditions, sea state, and monitoring results.

Public Participation and Use Conflict Management

Public participation is a mandatory and cross-cutting element of the EIA process, and should occur in the EPDA and EIA phases, in accordance with Decree No. 54/2015 and Ministerial Diploma No. 130/2006. In the context of this Project, public participation is particularly relevant for identifying maritime space uses, fishing seasonality, navigation routes, concerns of coastal communities, expectations of sectoral authorities, and potential use conflicts.

In the EIA phase, the process should ensure the effective participation of environmental, maritime, fisheries, and port authorities, provincial and district administrations, Community Fisheries Councils, fishing centres, tour operators, industrial and semi-industrial fishing operators, civil society organisations, conservation institutions, and other relevant maritime space users.

A complaint and incident management mechanism should also be defined, which is accessible, documented, and operational during the mobilisation, operation, and demobilisation phases, including clear communication channels, response times, eligibility criteria, complaint registration, incident investigation, and reporting to the competent authorities.

Information Gaps and Requirements for the EIA

The main information gaps identified at this stage relate to the final definition of the campaign's operational parameters, including the acoustic source configuration, line geometry, number and length of streamers, final schedule, mobilisation routes, support port(s), manoeuvring zones, and detailed operational procedures. These elements are essential for acoustic modelling, risk assessment, and the definition of management measures.

Gaps also persist regarding the spatial and seasonal distribution of sensitive species, intensity and seasonality of fishing activities, presence of vessels not monitored by AIS, artisanal and semi-industrial offshore fishing patterns, tourist use of maritime space, underwater cultural heritage, and potential cumulative pressures with other offshore activities.

The EIA should therefore deepen the specialist studies on climate, oceanography and maritime traffic; marine ecology and biodiversity; socioeconomic environment, fisheries and tourism; underwater acoustic modelling; archaeology and cultural heritage; risk assessment and accidental scenarios; and assessment of impacts cumulative and, where applicable, transboundary.

Recommendations for the EIA Phase

It is recommended that the EIA phase proceed with the confirmation and updating of the Project description, distinguishing confirmed information, preliminary information, and technical assumptions subject to validation. The assessment should separately consider the mobilisation, operation, and demobilisation phases, as well as plausible accidental scenarios.

It is also recommended that the EIA adopt a risk-based impact assessment methodology, combining qualitative and quantitative analysis where applicable, and considering magnitude, extent, duration, reversibility, receptor sensitivity, probability, residual significance, and degree of confidence. The impacts

cumulative impacts should consider other geophysical operations, maritime traffic, fisheries, port activities, coastal tourism, and other current or foreseeable pressures on the same receptors. cumulative The Environmental Management Plan should translate the EIA results into clear, verifiable, and auditable operational measures, including, at least, plans for underwater noise and marine fauna management, maritime navigation, communication and interaction with fisheries, waste and effluents, spill prevention and response, environmental monitoring and reporting, and complaints management.

The Environmental Management Plan should translate the EIA results into clear, verifiable, and auditable operational measures, including, at least, plans for underwater noise and marine fauna management, maritime navigation, communication and interaction with fisheries, waste and effluents, spill prevention and response, environmental monitoring and reporting, and complaints management.

Final Conclusion on Environmental Pre-Feasibility

Based on the information available at this EPDA stage, it is considered that the 3D Marine Seismic Acquisition Project in areas AS7 and AS8 does not, at this stage, present fatal environmental or social flaws that would prevent its progression to the Environmental Impact Assessment phase.

This conclusion is conditional and preliminary. The definitive environmental viability of the Project will depend on the completion of the specialised studies defined in the Terms of Reference, underwater acoustic modelling, detailed assessment of interactions with marine biodiversity, fisheries, navigation, tourism, coastal communities, and cultural heritage, as well as the integration of the results from the Public Participation Process.

It is therefore recommended that the present EPDA and its respective Terms of Reference be approved by MAAP, allowing the transition to the EIA phase, during which the potential impacts should be confirmed, mitigation and monitoring measures defined, the Environmental Management Plan structured, and the acceptability of the Project's residual impacts demonstrated based on robust technical grounds.

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Annex I – Environmental Consultant Certificate

REPÚBLICA DE MOÇAMBIQUE
MINISTÉRIO DA AGRICULTURA, AMBIENTE E PESCAS

Declaração nº 94/CA/MAAP/GM - SETA/2025

Assunto: Confirmação da Emissão do Certificado de Consultor Ambiental

Exmos Senhores,

O Ministério da Agricultura, Ambiente e Pescas (MAAP) faz saber a quem possa interessar, que a empresa **Solis Ad Sapientiam, Lda**, foi registada nos termos do Artigo 23, do Regulamento sobre o Processo de Avaliação do Impacto Ambiental, aprovado pelo Decreto nº 54/2015, de 31 de Dezembro, para o exercício da actividade de Consultoria Ambiental.

Contudo, com a extinção do Ministério da Terra e Ambiente (MTA) e criação do Ministério da Agricultura, Ambiente e Pescas (MAAP), através do Decreto Presidencial nº 01/2025, de 16 de Janeiro, todos os Certificados de Consultor Ambiental impressos com o nome do **MTA** ficaram inutilizados, estando a Instituição em processo de reestruturação, o que exigirá a substituição dos antigos certificados.

Informar ainda que a mesma enquanto aguarda pelo Certificado de Consultor Ambiental, poderá conduzir processos de Avaliação do Impacto Ambiental e Social, visto que cumpriu com todos os requisitos legalmente exigidos.

Com a afirmação da minha mais elevada estima e consideração.

Maputo, 07 de Novembro de 2025

O Secretário de Estado de Terra e Ambiente

Gustavo Sobrinho Dgedge

Rua da Resistência; 1746/47, C. P. 2020, Maputo

Annex II – Project Categorisation

REPÚBLICA DE MOÇAMBIQUE
MINISTERIO DA AGRICULTURA, AMBIENTE E PESCAS
DIRECÇÃO NACIONAL DO AMBIENTE E MUDANÇAS CLIMÁTICAS

À:
Solis Ad Sapientian, Lda
Att: Exmo Sr. Manuel Viçoso
Coordenador de Projecto

Maputo

N/Ref° N° 211 MAAP/ /DINAMC/GDN/220/26 Data: 08-05-2026

Asunto: Instrução do Processo de Avaliação Ambiental do Projecto de Aquisição Sísmica Marnha nos Blocos AS8 & AS7, ao largo das Provincias de Sofala e Inhambane.

Direcção Nacional do Ambiente e Mudanças Climáticas (DINAMC) recebeu o documento de V.Excia com assunto em epigrafe, com vista ao licenciamento ambiental do projecto, o qual mereceu a devida análise técnica.

Feita a revisão do mesmo, a DINAMC comunica a V.Excia que a actividade de desenvolvimento em epigrafe, foi classificada como sendo de categoria "A", portanto, sujeita a realização do Estudo do Impacto Ambiental (EIA) nos termos do Artigo 11 do Regulamento sobre o Processo de Avaliação do Impacto Ambiental, aprovado pelo Decreto n° 54/2015, de 31 de Dezembro.

Informa-se ainda que a anteceder o EIA, deverão ser submetidos à nossa instituição quinze (15) cópias do Estudo de Pré-Viabilidade Ambiental e Definição de Âmbito (EPDA) e os respectivos Termos de Referência (TdR) para o projecto, em formato de papel A4, sendo 3 para SPA de Inhambane, 3 para SPA de Sofala e 9 para DINAMC, e o respectivo formato electrónico.

Com os melhores cumprimentos.

A Directora Nacional

Sónia Ricardo Muando
(Investigadora Assistente)

CC.: SPA- Inhambane
SPA- Sofala

Rua da Resistência, 1746/47, C. P. 2020, Maputo, mta@mta.gov.mz RNW

ANNEX III – Copy of the announcement of the results of the Third Tender for the Acquisition of Geophysical Data in the Sedimentary Basins of Mozambique

INSTITUTO NACIONAL DE PETRÓLEO

ANÚNCIO DE CONCURSO PÚBLICO

TERCEIRO CONCURSO PARA AQUISIÇÃO DE DADOS GEOFÍSICOS NAS BACIAS SEDIMENTARES DE MOÇAMBNIQUE

1. Na sequência da necessidade de extensão da avaliação do potencial petrolífero do território nacional e cobertura em dados geofísicos, o Instituto Nacional de Petróleo (INP), anuncia o lançamento do terceiro concurso para aquisição dos dados supramencionados.

2. Para efeitos de aquisição dos Documentos de Concurso, as empresas interessadas deverão depositar o valor de **100.000,00** meticais na conta nº 109503010, no banco Millennium BIM, titular Instituto Nacional de Petróleo e apresentar o respectivo talão de depósito.

3. As manifestações de Interesse devem ser dirigidas ao Instituto Nacional de Petróleo (INP), sito na Rua dos Desportistas, Aterro do Maxaquene, Parcela nº 259/E, Cidade de Maputo, devendo os proponentes demostrar:
   - Capacidade técnica e financeira;
   - Politicas de saúde, segurança e ambiente;
   - Certificados e documentos de Habilitação;
   - Experiência em Aquisição, Processamento e *Marketing* de dados sísmicos e potenciais.

4. As manifestações de Interesse e respectivos documentos, deverão ser apresentados em língua portuguesa (ou traduzidos por tradutor oficial ajuramentado), em triplicado, e acompanhados de cópia digital em USB, devidamente acondicionados em envelope lacrado e identificado, e entregues no endereço acima indicado, num prazo de 45 dias a partir da data da publicação deste anúncio, isto é, até às 12:00 horas do dia 31 de Outubro de 2025.

5. As propostas serão abertas em sessão pública no edifício sede do INP, às 14 horas do mesmo dia 31 de Outubro de 2025.

6. A selecção e todo o procedimento obedecerá as boas práticas da indústria petrolífera, e ao disposto no Regulamento de Contratação de Empreitada de Obras Públicas, Fornecimento de Bens e Prestação de Serviços ao Estado, aprovado pelo Decreto nº 79/2022 de 30 de Dezembro.

7. Para esclarecimentos adicionais, os interessados poderão contactar o INP no endereço indicado, de segunda a sexta-feira, das 7:30h às 15:30h ou através dos seguintes contactos: +258 83 9511000/ +258 21 248300; email: info@inp-mz.com, website: www.inp.gov.mz.

Maputo, 17 de Setembro de 2025

A Autoridade Competente

Rua dos Desportistas n.º 259E, Maputo – Moçambique I Tel: +258 21320935 I Cel: +258 823081570 I comunicacao@inp.gov.mz I www.inp.gov.mz I

INSTITUTO NACIONAL DE PETRÓLEO

CONSELHO DE ADMINISTRAÇÃO

3° CONCURSO PARA A AQUISIÇÃO DE DADOS SÍSMICOS (2D, 3D) E POTENCIAIS (AÉREO GRAVIMÉTRICO E MAGNÉTICO)

ANÚNCIO DOS RESULTADOS

O Instituto Nacional de Petróleo (INP), na qualidade de entidade responsável pela avaliação e pesquisa de áreas prospectivas nas bacias sedimentares de Moçambique, em cumprimento do disposto no Regulamento de Contratação de Empreitadas de Obras Públicas, Fornecimento de Bens e Prestação de Serviços ao Estado, aprovado pelo Decreto nº 79/2022, de 30 de Dezembro, comunica o resultado do concurso acima descriminado:

Concorrente vencedor	Área*	Tipo de Dados a Adquirir
SLB	AS1_25	Sísmica 3D
	AS2_25	
	AS7_25	
	AS8_25	
Viridien	AS3_25	
GeoEx	AS5_25	
GeoPartners	AS6_25	
TGS	AS1_25	Sísmica 2D
	AS2_25	
	AS3_25	
	AS4_25	
	AS7_25	
	AS9_25	
	AS10_25	
Bravura	AGM1_25	Aéreo Gravimétrico e Magnético
TGS	AGM2_25	
	AGM3_25	

*Coordenadas conforme publicado no Jornal Notícias dos dias 17 e 18 de Setembro de 2025

A Autoridade Competente