Term of Reference

File Nº 02007.003499/2019-91

OFFSHORE WIND FARMS

GENERAL INSTRUCTIONS

This Term of Reference −TR aims at determining general technical guidelines and criteria that should underpin the elaboration of the Environmental Impact Study − EIS and its *Relatório de Impacto Ambiental* − RIMA (Environmental Impact Report) in order to subsidize the previous environmental licensing process of Brazilian Institute of Environment and Renewable Natural Resource − IBAMA.

It is applicable to processes with significant environmental impact, being adapted to the particularities of the project and the region where it is inserted, according to information provided by the entrepreneur in the Activity Characterization Sheet. Experimental projects, with up to two turbines, or installed on existing platforms, may require a simplified environmental study.

The study should be written with a logical organization of information in chapters, with the location of important data in summaries and indexes.

The Environmental Impact Study should be presented in PDF format, with optical character recognition − OCR and in files of less than 80 MB in size. Visual communication mechanisms, such as figures, photographs, maps and graphs should be used. As the case may be, attachments may be delivered in other formats accepted by the *Sistema Eletrônico de Informação* – SEI (Electronic Information System), namely: 7Z, BZ2, CSV, GZ, HTM, HTML, JSON, KMZ, MP4, MPEG, MPG, ODP, ODS, OGG, OGV, PDF, SVG, TAR, TGS, TXT, XML, ZIP. Spatial information must be sent as a compressed file in shapefile format − SHP, SHX and DBF, using geographical coordinate system and Datum SIRGAS 2000; raster products (orbital images, processing and aerial photos) in GEOTIFF format; and unlocked spreadsheets in ODS or XLSX format. The raw data and listings elaborated during the environmental assessment should also be presented in an editable spreadsheet, according to the standard table available at http://www.icmbio.gov.br/sisbio/dados-delicenciamento.html.

The scope of this Term of Reference includes the wind-energy generating units; the submarine grid connector; the maritime substation; the power transmission grid, including its submarine and underground terrestrial stretch, as well as the air segment up to the connection with the *Sistema Interligado Nacional* − SIN (National Interconnected System); the terrestrial substation and the exclusive support areas for the work. In case the proposed transmission line − TL does not fit in the simplified procedure, according to the terms of Article 5º of MMA Ordinance Nº 421 of October 26, 2011, its diagnosis must meet the requirements of the basic TR for transmission lines.

The following itemization is established for EIS/Rima.

1. INTRODUCTION

*This chapter aims to present, **in short**, the context of the elaboration of the study and its conclusions, in order to introduce the reader to its content.*

a) Briefly describe the undertaking/activity and the environment in which it will be develop.
b) Present a brief history on the undertaking and its environmental licensing process.
c) Indicate the objectives of the enterprise and its economic, social and political relevance, in the regional, state, national and international spheres (when applicable).
d) Justify the need for its deployment and operation.

2. IDENTIFICATION

This chapter aims to present the information about the enterprise proposer and the technical team responsible for the study elaboration.

In this chapter the information to be provided should be restricted to those itemized in this Term of Reference, in order to avoid the inclusion of additional texts of little relevance to the environmental licensing of the enterprise or to avoid the inclusion of information that will be provided in other chapters of the Study.

The legal entity responsible for the undertaking is understood as an entrepreneur.

The company responsible for preparing the study is the legal entity contracted by the entrepreneur to carry out the study.

The team responsible for the elaboration of the study is understood as the set of qualified professionals who participated in the elaboration of the study.

It is imperative to emphasize that the entrepreneur and the professionals who subscribe to the study are responsible for the information presented, subjecting themselves to administrative, civil and criminal sanctions.

2.1. Identify the Entrepreneur

a) Name or company name.
b) Cadastro Nacional de Pessoa Física − CNPJ; (National Register of Legal Entities) c) Full address. d) Phone and e-mail.
e) Legal representatives (name, CPF, address, phone and e-mail).
f) Cadastro Técnico Federal − CTF (Federal Technical Registry) (not mandatory at this stage).
g) Previous experience in offshore wind projects (MW installed or under installation; countries).

2.2. Identify the Consultancy Company

a) Name or Company Name.
b) Cadastro Nacional de Pessoa Física − CNPJ; (National Register of Legal Entities). c) Full address.
d) Phone and e-mail.
e) Cadastro Técnico Federal − CTF (Federal Technical Registry) (mandatory).

f) Legal representatives (name, CPF, address, phone and e-mail).

2.3 Identifying the Multidisciplinary Team

a) Present the names and academic training of the professionals who are part of the multidisciplinary technical team responsible for the elaboration of the study, identifying the team coordinators of the different areas; Registration number in the respective Class Board, when applicable; registration number in the Federal Technical Registry and ARTs, when appropriate.

3. CHARACTERIZATION OF THE UNDERTAKING/ACTIVITY AND ITS ALTERNATIVES

This chapter aims at describing the main motivations and justifications for the development of the proposed undertaking, the characteristics of the project, the main phases and activities envisaged, as well as its estimated timeline. It is understood that the clearer the understanding regarding the activities foreseen for the implementation and operation of the project, the more objective and concise will be the identification and assessment of environmental impacts.

This item should not identify and evaluate positive and negative impacts, nor discuss issues associated with the study of alternative locations and technology that will be addressed further on.

3.1 Contextualization of the project in the scope of the country's Electrical Planning and of the international commitments made by Brazil associated with the sector.

In this chapter it is not expected analyses on the potential negative or positive impacts of the project, but clarification on the connection between the proposed enterprise and the national sector planning, emphasizing the justification for its implementation and operation.

a) Briefly describe the connection between the undertaking and the indicatives present in the short- and long-term planning documents of the national electric sector.
b) Briefly describe the connection between the undertaking and the international commitments made by Brazil associated to the electric sector.

3.2. Contextualization of the project in the framework of national and regional marine planning

This chapter is not expected to analyze the potential negative or positive impacts of the project, but to clarify the connection between the proposed project and the national or regional marine planning, when existing.

a) Briefly describe the relationship between the project and the indicators present in the short- and long-term planning documents on the use of the national and

regional marine space, pointing out the applicable recommendations present in the Plans and Programs, when existing.

3.3. Contextualization of the project in the scope of national and regional environmental planning

The objective of this item is to clarify the relationship of the enterprise with the national, regional, state and municipal environmental planning. Analyses on potential negative or positive impacts are not expected in this chapter, such as analysis of cumulative or synergistic impacts with other ongoing actions at the regional level, which will be addressed later in the study.

a) Briefly describe the connections between the undertaking and national and regional strategic environmental policies or actions, pointing out the applicable recommendations present in the Plans and Programs, when existing.

3.4. Analysis of legal compatibility

a) Analyze the compatibility of the undertaking with the incident legislation, with government plans, programmes and zoning proposed or being implemented, as well as possible legal restrictions regarding the implementation and operation of the undertaking or activity.
b) Consider all existing federal, state and municipal legal provisions applicable to the undertaking relating to the use, protection and conservation of environmental resources, to the use and occupation of land, waste management, hazardous products, air emissions and liquid effluents.
c) Consider technical standards dealing with maximum parameters of negative externalities for noise, water quality and navigation safety.
d) Analyze the compatibility of the enterprise with the Coastal Management Plan, when existing.
e) Present certificates or permits from the municipal government where the terrestrial structures (port and jobsite) will be located, with a declaration that the location and type of undertaking or activity are in conformity with the law applicable to land use and occupation.

3.5 **Characterization of the Enterprise/Activities**

The characterization of the enterprise and related activities should be based on the preferred technological and local alternative. Its spatial organization should be prioritized, being the technical specifications essentially referential, which can be updated according to the development of the project and technologies, considering the corresponding environmental and energy reflexes. If there are differences between the preferred alternative and the other locational alternatives, only these inequalities should be specified, in the form of a comparative table.

a) Present georeferenced vector base, in shapefile format, containing all physical elements of the project (towers, cabling, support structures, routes, etc).

b) Describe, according to the following itemization, the main characteristics of the project.

3.5.1. Characterization of the Enterprise

3.5.1.1. Generation Units
3.5.1.1.1. Description of the wind complex

a) Address: (i) turbines location, (ii) location and type of structures for meteooceanographic measurements, (iii) type and technical specification of wind turbines, (iv) energy production, (v) description of the proposed transmission and cable system, (vi) proposed navigation lighting.
b) Detail: (i) expected power (MW), (ii) total area and percentage of area with intervention during all phases of the project: Planning, Deployment, Operation and Decommissioning.

3.5.1.1.2. General arrangement and flow chart of the process

a) Provide information on the stages of implementation of the project, which should refer to the technical aspects and the necessary infrastructure.
b) Characterize the infrastructure (existing and to be implemented) and the activities to be developed in the reference port.

3.5.1.1.3. Construction techniques to be used

a) Describe the construction methods of the offshore wind complex.
b) Explain the type and characteristics of the foreseen foundations, place of storage of the structures and inputs, place of pre-assembly and form of displacement to the installation site.
c) Describe the technology for the grounding system of the structures.

3.5.1.2. *Submarine collecting and transmitter grid*

a) Locate and describe: (i) submarine cables (characteristics, voltage, electrical current, construction techniques, depth, protection methods; (ii) submarine cable transition / underground cable.

3.5.1.3. Maritime sub-station

a) Present location of the marine substation and type of foundation.
b) Display substation characteristics and transformers (if any).

3.5.1.4. Terrestrial transmission Line

a) Describe and detail the project, technical data and georeferenced location of all the work and associated infrastructure.
b) Display the Technical Description of the Transmission Line.

- Voltage (kV).
- Total line length (km), width and area of the servitude strip.
- Width of service range.
- Transition of the underground cable / aerial transmission line.
- Estimated number and minimum and maximum tower heights (standard and special structures).
- Project premise regarding the elevation of the towers and the types of structures to be used in forest fragments.
- Average distance between towers.
- Minimum distance between cables and ground.
- Type and size of bases.
- Safety electrical distances.
- Grounding system for structures and fences.
- Existing substations requiring expansion.
- Position of the entrance/ exit porticos of the new Transmission Line.
- Identify other transmission lines that maintain the same servitude strip, as well as their distance.
- Indicate the interferences of the TL in the servitude strips of highways, railways, oil pipelines and pipelines, central pivots and aerodromes.
- Technical requirements for maintaining vegetation under and sideways to cables.
- Prediction of use of coated cabling (for prevention of fauna electrocution).

3.5.1.5. Ground substation

a) Briefly describe the terrestrial substation for the power, total area and energized patio, and rainfall drainage system.
b) Indicate interconnection points and location of substations.
c) Show characteristics of substations and transformers (if any).

3.5.2 Characterization of the supporting infrastructure

3.5.2.1. Construction site and Support Infrastructure

a) Characterize the area(s) for the construction site, including layout and description of its units, mechanical workshops and refueling stations.
b) Provide an estimate road, port and maritime traffic:

- Appropriateness to existing infrastructure; expected quantities of cargo to be transported; transshipment technologies to be used; size and scheme of operations and vessels.
- Description of the expected maritime flow of cargo and people for the different phases of the enterprise.

c) Describe the infrastructure and systems associated with the venture:

- Port storage and pre-assembly bases.
- Ships used in the installation of foundations, turbines, cables, substation and rockfill.

3.5.2.2. Accesses and routes

a) Represent the structures to be installed and the routes, duly identified, of all vessels engaged in the venture, in all its phases.
b) Estimate the frequency of vessels (quantity versus time unit) and their characteristics for each route.
c) Represent the land accesses and routes to be used in the transportation of megastructures, the needs of adaptation of roads and the plans of trafficability and safety.
d) Detail restrictions on the use of the enterprise area and permanent access to:

- Navigation during the installation phase.
- Navigation during the operation phase.
- Fishing, recreational and other uses during the installation phase.
- Fishing, recreational and other uses during the operation phase.

e) Indicate the secure navigation routes.
f) Indicate the navigational signage to be employed.

3.5.2.3 Dredging, Earthmoving and other Interventions

a) Predict, qualitatively, eventual dredging, if applicable, according to CONAMA Resolution Nº 454/2012, presenting:

- Delimitation, in georeferenced polygonal, of the areas to be dredged and the proposed disposal areas.
- Depth quotas to be reached.
- Estimate of the volume to be dredged and if there will be reuse of the material in the project or disposal at sea.
- Characteristics of the dredging equipment, as well as its methodologies and techniques of execution of the activity.

If there is a forecast of sediment launching at sea, locational alternatives should be evaluated for the definition of an Oceanic Disposal Polygon − ODP. The same premises and guidelines for the study of locational alternatives (Item 4) should be used for the definition of the disposal site(s), through the applicable criteria suggested in that item, minimally contemplating the evaluation of the hydrodynamics and trends of the dispersal of the launched sediment, with the support of numerical modeling tools; physicalchemical characteristics of the sediment, types of bottom, proximity

with Conservation Units, presence of fishing areas and other economic and recreational uses, as well as other sensitive receptors existing in the study area.

In case of disposal of the sediments at sea in a location already licensed, a copy of the environmental license in force must be presented.

3.5.3 Characterization of resources and effects of activities

3.5.3.1. Workforce

a) Characterize and quantify the workforce, specifying, by stage (installation and operation):

- The level of education and expertise required.
- Schedule of hiring and demobilization.

3.5.3.2 Inputs and Utilities

a) Characterize the inputs (solid and hazardous materials) to be handled. In regions of water shortage, the demand and availability of the resource should be characterized.

3.5.3.3. Wastes and effluents

3.5.3.3.1 Liquid Effluents

a) Characterize and estimate the quantities of liquid effluents generated in the implementation and operation of the undertaking.
b) Identify estimated qualitative characteristics for the identified liquid effluents.
c) Present the systems of control and treatment of the liquid effluents to be generated.

3.5.3.3.2. Solid wastes

a) Identify the sources of generation, quantitative estimates and their respective solid wastes to be generated in the implementation and operation of the undertaking.
b) Indicate the packaging and temporary storage points for the solid wastes generated and the final disposal sites.
c) Characterize the control systems and the adopted procedures associated with the sources identified, indicating the forms and final disposal sites of the residues.

3.5.3.4. Noise, Vibration and Artificial Luminosity

3.5.3.4.1. Noise and vibration

a) Describe the main sources of noises of the enterprise, for the deployment and operation phases.

3.4.11.2. Luminosity of Artificial Light

a) Present the artificial lighting forecast for the wind turbines, underwater substation, structures that may be installed on the shoreline and vessels/ structures used during the construction. Observe the pertinent legislation to the subject (e.g., Ordinance Nº 11, of January 30, 1995 (D.O.U. of January 31, 1995), Law BA nº 7.034 of February 13, 1997 (D.O.E. of February 13, 1997); and CONAMA Resolution nº 10, of October 24, 1996).
b) Specify wavelength, intensity, emission pattern (continuous/intermitting) and direction of light sources.

3.5.4 Decommissioning

Present the decommissioning plan of the complex, contemplating:

a) Structures to be removed.
b) Methods and techniques for demobilization; and
c) Disposal of waste.

3.5.5 Exclusion zones of other maritime activities (navigation, fishing, tourism, oil and gas exploration, etc.): polygonal security of the enterprise.

a) Represent the security polygonal of the enterprise, presenting possible navigation routes and options of locational adjustments, in the distribution of the wind towers and in the cable/mooring protection.
b) Characterize the pre-existing activities in the exclusion zones.

3.6 Schedule

a) Present an estimated physical schedule of all phases of the enterprise, including any seasonal restrictions related to environmental or socioeconomic factors.
b) Total estimated cost of the enterprise.

4. TECHNOLOGICAL AND SITE ALTERNATIVES

Considering that there is still no Marine Spatial Planning in Brazil, the international experience of countries that have numerous wind farms installed in their marine areas and the respective technical criteria adopted by them for the allocation of projects, in order to control and mitigate environmental impacts and conflicts of use recurring to

this type of enterprise (mainly those related to tourism activities, impacts on the landscape, wader birds, coral occurrences, greater environmental sensitivity of shallow areas and the creation of exclusion areas for fishing, among others), it is recommended a careful evaluation regarding the distance from the coast.

In order to determine the minimum distance from the coast, the impacts foreseen in the region where the enterprise is located should be considered. In the case of a region where artisanal fishing occurs, the minimum distance from the coast should consider the fishing areas traditionally used and/or the distance recommended by studies, such as Xavier et al, 2020; Schubert et al, 2019, which propose 18.5 km and 20 km, respectively.

Regarding wader birds, scholars point out that the potential impact on the group is limited to the coastal strip around the stopping points and wintering along the migration routes. Thus, the study should characterize the attractive environments on the coast and their use by this group of birds, allowing the inference of the degree of local risk.

Regarding visual impacts, the EIS should establish a minimum distance based on reference studies, such as DTI (2005) and BMT Cordah Limited (2003) (Table 1), which correlate the sensitivity of the coast with the adequate distance from the offshore wind farm in order to minimize the visual impact.

Table 1. Estimated visual effects of the enterprise in landscape units with different degrees of sensitivity (adapted from DTI 2005).

Sensitivity of the landscape unit	Significance of the effect		
	Small effect	Medium effect	High effect
Low	> 8 km	--	< 8 km
Medium	> 13 km	8 - 13 km	< 8 km
High	> 24 km	13 - 24 km	< 13 km

To justify the minimum distance from the coast it is necessary that the EIS assess what impacts the venture will cause and what distance is recommended to mitigate them. It is recommended that a table be presented to demonstrate the impacts identified in the region, the distances related to each impact, and the study or studies that supported the proposed distance.

The references cited here are exemplary, the EIS may use other theoretical frameworks to justify and substantiate the minimum distance from the proposed alternative.

Recommended references:

Xavier T; Gorayeb A; Brannstrom C. Energia Eólica Offshore e Pesca Artesanal: impactos e desafios na costa oeste do Ceará, Brasil. In: Muehe D; Lins-de-Barros FM; Pinheiro L (orgs.) Geografia Marinha: Oceanos e Costas na Perspectiva de Geógrafos. – Rio de Janeiro: PGGM, 2020. ISBN 000-0000000-00-0

Camargo Schubert Engenheiros Associados. Atlas Eólico e Solar: Ceará. Curitiba: Camargo Schubert; Fortaleza: ADECE : FIEC : SEBRAE, 2019.

BMT Cordah Limited, Offshore Wind Energy Generation: Phase 1 Proposals and Environmental Report For consideration by the Department of Trade and Industry. 2003

DTI. Guidance on the assessment of the impact of offshore wind farms: Seascape and Visual Impact Report. Department of Trade and Industry. UK, 2005.

a) Identify and qualify the sites and technological alternatives studied for the implementation of the enterprise, considering the technical, economic and environmental aspects.
b) Contemplate, regarding the technological alternatives, the options related to the minimization of environmental impacts in wind power generation projects, such as: type of foundations, height of towers, length of blades, speed of rotation, colors of structures, lighting, systems for the identification of risk of collision by birds, among others.
c) Evaluate site alternatives of the enterprise in order to avoid the main associated negative impacts, based on the activity-restrictive or environmentally sensitive areas.
d) Propose a preferential alternative, resulting from the comparison of three viable alternatives, through a classification based on the relative level of interference of each one with the environmental variables relating to the physical, biotic and socioeconomic environment that were preexistent to the enterprise, according to the Identification Map of Preexisting Multiple Uses, and also considering variables such as wind potential, distance from shore and depth.
e) Justify the reasons that subsidized the choice when compared to the other alternatives and in the light of the established technologies and international trends, comparing them with the hypothesis of not implementing the project.

For the proposition of the location alternatives, the entrepreneur must:

- Define the economic and operational polygonal viability of the Project from the port area of reference for installation of the enterprise, justifying all technical criteria adopted for the delimitation of the total offshore extension, which should be in line with best practices in use in international experience.
- Perform a survey of the characteristics of the seabed considered potentially viable for receiving of the project. The area should be investigated to its full extent for

the purposes of general characterization of the type of sea bottom and its respective sensitivity to the aspects of the project. The degree of detail and methodologies to be adopted for this investigation should at least be able to indicate the existing sea bottom type(s) pattern(s) and its variation in space.

- Identify if there is total or partial overlap of the study polygonal with marine conservation unit.
- Based on the sea bottom map of the general area identified as operationally feasible for receiving the project, the location alternatives should be evaluated and foreseen.
- Apart from the potential enterprise allocation polygon, based on the variables listed above and on the Identification Map of Preexisting Multiple Uses, only those which have no pre-existing non-viable hypotheses should be accepted as location alternatives.

The following guidelines for building the Identification Map of Pre-Existing Multiple Uses should be adopted:

- Employ geoprocessing techniques in the integrated evaluation of the different themes.
- Provide the criteria for determining the relative importance of each theme.
- Consider at least the following layers of information in their composition:
    - Priority areas for biodiversity conservation (MMA Ordinance Nº 463/2018).
    - Reefs formations.
    - Avifauna: migratory routes, Important Bird Areas ("IBAs"), Areas of concentration of wader and sea birds. ○ Marine mammals: IN IBAMA/ICMBio 02/2011. ○ Turtles: IN IBAMA/ICMBio 01/2011. ○ Potentially conflicting activities: fishing, tourism, water sports, navigation routes, oil and gas exploration, offshore wind complexes in operation or already authorized, etc.
    - Underwater noise modelling (generated during the installation phase); ○ Modelling of visual impact on the coast and potential or consolidated offshore tourist attractions.
    - Port and fishing navigation routes currently operating within the study polygonal, identifying the port ventures and the fishing colonies that can be reached by the exclusion navigation zones after the implementation of the undertaking. ○ Mineral (terrestrial and marine) exploration granted, in prospection or in operation, in the polygonal of the study.

5. AREA OF STUDY −AS

This chapter aims to delimit the Study Area, that is, the one in which information will be collected in order to characterize and describe the environment potentially affected by the project.

The Study Area must cover the territory in which the continuity of physical, biotic and socioeconomic environmental factors is observed, which are considered relevant to the understanding of the preliminary impacts foreseen and for the future definition of the enterprise's Area of Influence.

The definition of the boundaries of the Study Area must be duly justified, demonstrating which environmental factors have been analyzed, the area of coverage of these factors and the level of significance attributed to them.

The AS must be representative for the purposes of surveying data, primary or secondary, of the physical, biotic and socioeconomic environments. Such studies must provide information for the elaboration of the environmental diagnosis, the choice of the locational and technological alternative and for the technical basis of the prognosis that will attest or not the socio-environmental viability of the enterprise.

6. DIAGNOSTIC

The objectives of this chapter are:

a) *Present environmental diagnosis of the Study Area with a complete description and analysis of the environmental resources and their interactions, as they exist, in order to characterize the environmental situation of the area, before the implementation of the project.*
b) *Describe and use, for the elaboration of the diagnostic, a scientifically proven and compatible methodology based on survey, organization, consolidation and analysis of the pre-existing data, as well as through procedures that facilitate the collection, consolidation and analyses of primary data.*

The diagnostic should portray the current environmental quality of the Area of Study, indicating the characteristics of the various factors that make up the environmental system, in order to allow the full understanding of the dynamics of the area before the implementation of the enterprise, considering the interactions between the physical, biotic and social economic environments

Data and information surveys may be carried out from secondary data, only and exclusively if they have been produced within the technical requirements of this TR, by scientific studies or other enterprises in the region.

The primary and secondary data requirements presented in this chapter are: (i) reflect the current situation of the analyzed components; (ii) are representative of the Study Area; (iii) present adequate methodology, as described below in each item; (iv) be informed the time of the year in which they were collected.

6.1. Physical Environment

Consider, in the diagnosis of the physical environment, the subsoil, the waters, the air and the climate, highlighting the mineral resources, the topography, the types and aptitudes of the soil, the bodies of water, the hydrological regime, the marine currents and the atmospheric currents.

6.1.1. Climatology and Meteorology

a) Characterize regional and local weather conditions under various time scales, considering the occurrence of extreme events. Provide information on temperature, precipitation, evaporation, relative humidity, sunstroke, atmospheric pressure and wind regime parameters (direction and intensity). Characterize the periods of reduced visibility throughout the year.
b) Present the data analyzed in the form of maps, tables and graphs, with annual and monthly historical averages, highlighting extreme events. Include recent and historical series of data.
c) Present, regarding the wind regime, for the study area and for each season of the year identified in the seasonal, or quarter analysis in the absence of identified seasons, monthly Wind Roses and seasonal periods; maps with grid of intensity and direction or wind fields of the Climatological Normals of medium, maximum and minimum; and directional histograms of the region's winds.
d) Consider, for the area of study, the wake effect resulting from other wind enterprises designed or authorized in the region.

6.1.2. Oceanography

a) Provide information on temperature, salinity, density, water bodies, currents, waves and tidal regime parameters.
b) Perform analysis of averages, minimum and maximum and the aspects inherent to intra and interannual variations of the study area;
c) Evaluate the correlations between phenomena and parameters analyzed at different scales, seeking a complete understanding of the oceanographic system of the study area;
d) Include recent and historical series of oceanographic station data located in the area of study;
e) Display the analyzed data in the form of maps, tables and graphs.

6.1.3. Identification of extreme phenomena (Weather and Oceanography)

a) Characterize extreme meteorological and oceanographic phenomena such as winds, currents, waves and weather tide. Assess the events identified as relevant to meteorology and oceanography in the AS for their extreme occurrences.
b) Display a table or list of extreme events containing the following information: Event identification; Event frequency; Region within the AS, where it occurs

most frequently; Minimum and maximum intensity of events; and possible adverse consequences of events for the enterprise.

6.1.4. Noises and Vibrations

6.1.4.1 Marine environment

a) Characterize the underwater noise levels in the Study area.

6.1.4.2. Terrestrial environment

a) Characterize noise levels in areas susceptible to increase due to the operation of construction sites or activities related to installation and operation.

6.1.5. Geology, Geomorphology, Pedology and Geotechnics

6.1.5.2. Marine environment

a) Characterize and geoespacialize the geological and geomorphological units present in the study area, indicating the types of sea bottom occurring, according to the orientation presented in item 4.
b) Carry out geotechnical investigations, on a preliminary basis, of the preferred location alternative, in order to define the type of foundation technology to be adopted in the project.
c) Characterize the superficial layer of the sediments of the study area in accordance with the orientation of the CONAMA Resolution Nº 454/2012, and the sample mesh adopted should be presented. The possible exclusion of characterization parameters should be justified based on recent and representative secondary data of the study area.

If there is a prediction of dredging, in the sample mesh of the sediment characterization, the evaluation of the dredging areas and sediment disposal should be contemplated. *6.1.5.1. Terrestrial environment*

a) Characterize and geospatialize the geological and geomorphological units present in the study area based on the interpretation of satellite images, aerial photographs and field observations.
b) Carry out mapping and characterize the soil classes, taking as reference the Classification System of the Empresa Brasileira de Pesquisa Agropecuária - EMBRAPA (Brazilian Agricultural Research Company). (i) For the ADA, a survey should be carried out seeking the description of the soil types identified at an appropriate level for the installation of TL and other installations on land, associated with the wind complex. (ii) On a smaller scale (the rest of the study area) the characterization of the continental fraction may be carried out from secondary data or semidetailed surveys and recognition. (iii) The parameters evaluated in the laboratory should take into account the variables related primarily to the context of environmental conservation,

giving priority to the measurement of parameters related to the maintenance and conservation of the biotic and abiotic environments.

c) Identify and map areas prone to geotechnical instabilities or with susceptibility to erosion.
d) Perform, for the ADA, planialtimetric/batimetric survey in an appropriate scale for defining and identifying the main formations.

6.1.6. Water quality

6.1.6.1. Marine environment

Contemplate, in the characterization of the water quality, the parameters of turbidity, total solids and oils and greases, as well as eventual pollutants potentially present in the marine area where the project is expected to be implemented, according to the existing uses and sources in the locality. Whenever the local depth allows, samples should be collected on the surface, at half water and bottom.

6.1.6.2 Terrestrial environment

In case of impact on water bodies (e.g.: capture or discharge of effluent from construction sites, crossing of TL, proximity between water bodies and cutting areas and landfill): Identify eventual pollutant sources, punctual and diffuse, and points of release and/or disposal of domestic and industrial effluents in water resources, in the study area.

6.1.7. Coastal hydrodynamics and sediment transport

a) Characterize the coastal hydrodynamics of the study area. In the absence or scarcity of information, primary data should be obtained by including the minimum measurement period of one month.
b) Work the data in an integrated way, describing the inter-relations between tides, waves and currents, also relating to meteorological data, in order to describe the patterns of hydrodynamic behavior active in the area of study of the enterprise according to the times of the year.
c) Characterize sediment transport processes along the coast, defining potential regions of accretion and coastal erosion.
d) Include, in the characterization, the historical survey of the geomorphological evolution of the coastline, relating it with the regimes of waves and currents.
e) Use, for coastal hydrodynamics and sediment transport processes, in addition to observational methods, the computational modeling tool.
f) The modeling shall be able to predict the likely interference of the wind farm in the marine and coastal environment on the patterns of hydrodynamic circulation, wave propagation and sediment transport in the Direct Influence Area (DIA), also presenting the results of bathymetric changes in the coast line morphology due to such structures.

g) Use the modelling under various scenarios (winter – cold front entrance, summer, spring and neap tide period).

h) Present the model's characteristics and the history application, describing the modelled domain, input data and its origins, calibration and validation procedures, rotating times, modelled scenarios, post-processing techniques and other characteristics that are considered important.

i) Consider the following criteria during modelling assessment:

- Adequacy of the numeric model to the problem.
- Methodological strategy.
- Quality and adequacy of input data.
- Quality and suitability of post-processing techniques.
- References, criteria and arguments considered in the interpretation of the results.
- Interaction of the diagnoses obtained through modelling with those obtained through other methods.

6.2. Biotic Environment

The purpose of this chapter is to characterize the conditions of the environment prior to the installation of the undertaking, making it possible to compare it with the situation later on and, in relation to the most vulnerable groups, with control areas, aiming at identifying and measuring possible impacts. It also aims to identify relevant environmental issues and sensitive aspects inherent to each taxon that may be affected by the implementation of the venture. Where possible, multi-purpose campaigns should be conducted to reduce vessel movement and associated risks, such as accidental collision of marine mammals and turtles.

a) Substantiate the diagnostic {description} of the biotic environment on primary data (except when indicated or when there is availability of secondary data that reflect the current situation of the analyzed components), obtained in sample mesh and seasonality indicated for each taxon. The distribution of the campaigns should consider the seasonal specificities of the area of insertion of the enterprise.

b) Obtain, prior to the realization of the campaigns, Autorização para Captura, Coleta e Transporte de Material Biológico - ABio (Authorization for Capture, Collection and Transport of Biological Material), according to procedures defined in the IBAMA Normative Instruction Nº 8/2017. In case of capture and marking of wild birds, also obtain authorizations under the National Ringing System, managed by ICMBio/CEMAVE (IBAMA IN Nº 27/2002).

c) Observe the guidelines and recommendations of the National Action Plans for the Conservation of Endangered Species or Patrimônio Espeleológico - PAN (Speleological Heritage) corresponding to the taxons evaluated, available on the site of the Chico Mendes Institute for Biodiversity Conservation.

d) Characterize the flora and fauna of the project's study areas, describing the types of habitats found (including anthropogenic areas). Habitat types should be mapped, with indication of size in percentage and absolute terms.

e) Highlight the species most vulnerable to the enterprise, the ones which are indicators of environmental quality, those of scientific and economic value, the rare ones and those threatened of extinction, according to the IUCN and national and regional lists legally in force. If the place of occurrence of these species corresponds to a specific area, it should be shown on a map. All maps generated in the diagnosis must be provided in vector format (shapefiles), together with the raw data sheets (primary records) according to the standards defined in the "General Instructions" item of this TR.
f) Identify species of permanent, migratory or seasonal occurrence, indicating the time regime of occurrence of each species.
g) Identify the presence of invasive species and geospatialize the area of occurrence of these species in the AS.
h) Identify existing Conservation Units in the Study Area, describing their location, damping zone, creation objectives, history, existence of management board and permitted uses according to the corresponding category (set forth in Law Nº 9,985/2000) and with the Management Plan.
i) Identify, map and characterize the use and occupation of the soil, informing about the existence of areas of permanent preservation, agricultural use, access, etc.

6.2.1. Marine environment

a) Characterize in detail the locations where the submarine structures will be installed (foundations, anchors, cables, among others) regarding the biological communities that will be directly impacted. This characterization should indicate, in a conclusive way, the presence or not of reef environments in the affected area. The information must be gathered in a detailed map, in a scale suitable for visualization, with indications of bathymetry and faciology, in which the submarine structures to be installed are represented. The maps should highlight the distance that wind turbines and other subsea structures will present from the identified formations or possible interactions, if any.

6.2.1.1. Coral reefs environments

This topic aims to identify rich, vulnerable and poorly resilient habitats, such as coral and sandstone reefs, algae banks (calcareous or not), mollusks and marine phanerogams for which the enterprise must avoid interference. The National Action Plan for the conservation of coral environments is used as a reference.

a) Identify, describe and geospatialize areas of occurrence of coral reefs (including deep water corals) and sandstone, algae banks (calcareous or not), mollusks and marine phanerogams.

6.2.2.1. Benthic Community

This topic aims to characterize the nature of habitats and communities, as well as their level of sensitivity to the potential impacts of the enterprise. In addition to supporting the definition of the design layout and mitigating measures, it will

establish the baseline for future monitoring of impacts on the group in the area directly affected.

a) Define sampling mesh according to the spatial heterogeneity of the Area of Study.
b) Carry out a sample in triplicate (three sub-samples in each sampling unit) for the soft soil benthonic community.
c) Include the regional seasonality, with at least two campaigns, one of which in summer.
d) Characterize the nature and ecological status of habitats, ecological parameters (abundance, richness and biomass), structure and composition of communities, time variability, geographical distribution, remarkable species and species particularly sensitive to sediment resuspension.
e) Characterize the benthonic community of consolidated bottom considering the percentage of coverage of fouling organisms and zoning.
f) Identify and geospatialize habitats available for potential invasive species or their presence.
g) Select and determine the ecological quality index of the benthic compartment (e.g. M-AMBI).

6.2.2.2. Coral reefs, Reef Formations and/or Coralline Communities

This topic aims to identify rich, vulnerable and poorly resilient habitats, such as corals and algal banks, for which the venture should avoid interference. It is recommended, as a reference, the use of the National Plan of Action for the Conservation of Coral Environments.

a) Identify, describe and geospatialize the coral reefs' areas of occurrence (including deep-water corals) and banks of algae or mollusks.

6.2.1.3 Ichthyofauna

This topic aims to characterize the nature of habitats and communities, the degree of sensitivity to potential impacts and establish the baseline for monitoring the impacts on the group in the Area of Direct Influence, based on ecological metrics, and the Area of Indirect Influence, based on fisheries statistics. It is recommended the use, as reference, of the National Action Plans for the conservation of Sharks and Rays.

a) Propose sampling mesh considering Study Area and Control Area.
b) Include the seasonality, with at least two campaigns.
c) Characterize structure and composition of communities, use of habitats, trophic relationships, ecological parameters (abundance, richness and biomass), seasonal and interannual variability (fisheries statistics).
d) Identify species particularly sensitive to noise and relate to the corresponding modelling of noise emissions in the different phases of the enterprise.

e) Identify, geospatialize and describe the places of concentration of juveniles and adults, nurseries, migratory routes, areas and periods of reproduction and spawning of fish resources, as well as the important species for maintaining stocks.

6.2.1.4. Sea Turtles

This topic aims to identify the overlap of the areas affected by the venture with areas sensitive to the taxon, aiming at the adoption of preventive and mitigating measures. It is recommended the use, as reference, of the "Guia de Licenciamento Tartarugas Marinhas" (Marine Turtle Licensing Guide) (ICMBio, 2017), National Action Plan for the conservation of sea turtles (ICMBio, 2011) and IBAMA/ICMBio Normative Instruction Nº 01/2011).

a) Identify, characterize and map sensitive areas for each species occurring in the AS: spawning beaches, feeding areas and migration routes. In item 8. Analysis of Impacts, such areas should be related to the activities of installation and operation of the enterprise. For the installation phase, relate to support vessel traffic, lighting and noise emission (modeling), especially those associated with the implementation of the foundations. During the operation phase, the impacts associated with the lighting of wind turbines and maritime substation, the generation of electromagnetic fields and the availability of food resources near the maritime structures (reef effect) must be considered and mitigated.

a') The characterization of the use of the beachfront strip (plus 5 km for each side) as a nesting area for sea turtles, should, minimally, include the period between September and March, and indicate: i) which species use it, ii) the frequency throughout the period, iii) the density of nests per km of beach and per season, and iv) the frequency of strandings.

b) Indicate the species of sea turtles that occur in the Study Area presenting information about: i) abundance and ii) seasonality, informing the methodology used (aerial, on-board observations or high-definition image analysis).

6.2.1.5. Avifauna

This topic aims to characterize the nature of habitats and communities, the degree of sensitivity to potential impacts and, in addition to support the definition of the layout of the project as well as mitigating measures, establish the baseline for monitoring the impacts on the group in the Study Area, based on ecological metrics. It is recommended the use, as a reference, of the National Action Plans for the conservation of Albatrosses and Petrels, Seabirds and Migratory Shorebirds. Emphasis should be given to Procellariformes, Phaethontiformes, Charadriiformes and Suliformes, potentially more impacted by offshore wind typology. Attention should be paid to the possibility of the enterprise being located between areas of intense use by birds, such as between islands and mainland or between islands.

a) Propose sampling mesh covering the Area of Study for seabirds and waders, and Marine Control area.
b) Take account of seasonality, with at least four campaigns and use of tracking data available in open databases for consultation (Birdlife Tracking Data base). b') If reliable data on migratory routes on a local scale do not exist, monthly

campaigns should be conducted over one year.

c) Identify and geospatialize coastal environments of pronounced importance for the wader birds, informing the type of use by birds and relating it to the period of the year.
d) Perform observations from fixed points aiming to characterize the distribution, richness and abundance of the wader avifauna and its temporal variations.
e) Make observations from the coast, aiming to characterize the movement dynamics of the avifauna between land and sea. e') Carry out observations aimed at characterizing the dynamics of bird movement

between oceanic islands and the mainland, if the area intended for the installation of the enterprise is located between these areas.

f) Characterize in detail the distribution, richness, abundance and their temporal variations in the marine study area. Data should come from observations by specialists, in aerial or boat transects, being strongly encouraged the use of highresolution images obtained in low altitude flights (aircraft or UAVs). For any of the methods, it is recommended the optimization of resources with the simultaneous collection of data on birds, marine mammals and sea turtles.
g) Identify and geospatialize breeding sites, concentration and nesting of seabirds.
h) Characterize the movement patterns of birds, in order to subsidize the definition of the layout of the wind turbines and the availability of corridors, and the use of the airspace in the different altitude ranges, in order to identify species and/or groups more susceptible to collision with the turbine's blade sweeping area. Present studies dealing with the most frequent behavioral aspects and flight height for the species identified as potentially most impacted, with emphasis on Procellariformes, Phaethontiformes, Charadriiformes and Suliformes orders. If there are no published studies for the group, primary data should be obtained through appropriate methods.
i) Select indicator species to perform a spatial-temporal diagnosis and monitoring of movement patterns and response to the project, if the occurrence of migratory or partially migratory species, particularly sensitive or threatened, in the project area is identified through prior evaluation. The monitoring shall extend for five years, one during the diagnosis period and the others during the installation and operation phases of the project, if its feasibility and implementation are confirmed. As methods to be used, the use of radar or telemetry, for example, is recommended.

6.2.1.6. Chiropterans

This topic aims to identify the occurrence of the taxon in the Study Area, in order to reveal the potential impact and corresponding preventive and mitigating actions.

a) Propose a representative sample mesh of the study area, also suggesting the arrangement of sampling points in linear transect from the beach line to the offshore limit of the project, as well as in the coastal area closest to the wind farm.
b) Identify and geospatialize the use of habitats and migration corridors, as well as ecological parameters (abundance and wealth). On-site occurrence data should be collected over a year and in quarterly campaigns, using passive acoustic monitoring as the primary source of data.

6.2.1.7. Marine Mammals

This topic aims to characterize the nature of habitats and communities, the degree of sensitivity of populations facing noise and barrier effect caused by turbines, underwater works and vessels, as well as the responses to modifications of trophic resources. Thus, it should subsidize the definition of the layout of the project and mitigating measures. It is recommended the use, as a reference, of the National Action Plans for the conservation of Small Cetaceans, Large Cetaceans and Pinnipeds, Sirens, Porpoise and the Normative Instruction IBAMA/ICMBio Nº 02/2011.

a) Propose sampling mesh contemplating the Area of Study.
b) Take account of seasonality, with at least four campaigns.
c) Use observation methods by transects and passive acoustics. The use of highresolution images obtained in low altitude flights (aircraft or UAVs) is strongly encouraged, including by optimizing resources through the simultaneous collection of data on birds, marine mammals and sea turtles.
d) Identify spatially and temporally areas of concentration, reproduction, feeding and migration routes of marine mammals by species.
e) Describe the structure of populations using indicators (diversity, distribution and abundance), statistically characterizing eventual space-time variability.
f) Identify potentially sensitive species according to their hearing perception spectra and noise emission modelling, by frequency.

6.2.2. Terrestrial Vegetation

6.2.2.1. Terrestrial fauna

a) Present, by means of a bibliographic review, the list of species of fauna (annual fish, herpetofauna, avifauna and mammals) occurring in the study area, indicating the species included in the official lists of threatened fauna (including state lists), the endemic species, the rare ones, those of economic and hunting importance, the potentially invasive species, the migratory species with potential distribution in the study area and those that, due to their

behavior, have greater potential of impact with the structures of the enterprise to be installed.

b) Present, based on the identification of the habitats of threatened species, especially annual fish and fossorial mammals, an evaluation of sensitive areas, in order to subsidize the definition of preferential routes and preventive and mitigating measures. If areas of potential occurrence of threatened species belonging to these groups are identified, along the preferential route of TL or other structures on land, primary data should be obtained in the directly affected area.
c) Present, based on the identification of ecosystems and migratory routes attractive to birds, an evaluation of sensitive areas in order to subsidize the definition of preferential routes and the proposal for the installation of signage for birds along the TL aerial, as well as to measure the impact on this group.
d) Characterize the community of chiropters in the coastal belt, identifying and geospatializing their habitats and estimating ecological parameters (abundance and richness) from acoustic monitoring.

6.2.2.2 Terrestrial Vegetation

This topic aims to characterize the plant formations potentially impacted by the implementation of the terrestrial segment of the transmission line and support structures.

a) Identify and characterize, from primary and secondary data, the forest remnants, including floristic aspects, in order to determine the successional stage of vegetation. The qualitative and quantitative survey should include tree and shrub species, and should be qualitative only for subarbustives, herbaceous, epiphyte and lianas.
b) Identify and list the flora species, highlighting the endemic, rupicolous, rare, endangered, vulnerable, of significant ecological, economic, medicinal, food and ornamental values. Consider the MMA Ordinance Nº 443/2014 and the regional lists of threatened flora, when existing.
c) The identification of the species of conservationist interest should subsidize a Plant Germplasm Rescue Program, to be elaborated with the PGA, considering the phenology of the species occurring in the area, obtained from secondary data, aiming the planning of the collection of the viable biological material (seeds, seedlings and germplasm) for the purposes of the forest recomposition.
d) Estimate the possible areas of vegetation suppression in the DAA. The actual quantity will be required at a later stage, within the scope of the Forest Inventory.
e) Elaborate a current vegetation map, with indication of succession stages.
f) Identify, quantify and geospatialize, for DAA, the interferences with Permanent Preservation Areas − PPA defined by the Forest Code and its amendments; CONAMA Resolutions and state legislation.

6.3. Socioeconomic Environment

a) Consider, in the diagnosis of the socioeconomic environment, the use and occupation of the soil, the uses of marine space, the uses and availability of water and the socioeconomics, highlighting the relation of dependence between the local society, the environmental resources and the potential future use of these resources.
b) Characterize and analyze the current socioeconomic and environmental condition of the study area, enabling the correct identification and evaluation of the social and environmental impacts that may be caused by the planning, implementation and operation of the undertaking, directly or indirectly.
c) Identify the migratory flows informing regional origin, length of stay in the municipality, possible causes of migration, specifying propositions of location, work and access.
d) Propose methodology for the Socio-Environmental Participatory Diagnosis – SEPD before its execution, focusing on the fishing colonies that navigate and current develop their activities in the area of direct influence.
e) Present a scale of socio-environmental vulnerability of the affected groups in the areas of direct and indirect influence, based on primary and secondary data, in order to identify the priority subjects/groups of the educational action of the PEA, according to the guidelines expressed in the Guide for the Preparation of Environmental Education Programs in Federal Environmental Licensing, approved by IBAMA Ordinance Nº 1.728, of 07/28/2020.
f) Utilize, for the characterization of the Regional Study Area, more recent secondary data from official institutions (IBGE, DATASUS - Ministry of Health, IPEA− Institute of Applied Economic Research, Atlas of Human Development, State Government, Municipalities, among others), universities and other local and regional entities that enable the understanding of the themes in question, being complemented, when necessary, with primary data. Present all requested indicators with the respective comparisons with regional, state and national indicators.

6.3.1. Population Dynamics

6.3.1.1 Population

a) Identify and geospatialize the social groups that are users of the marine coastal area, mainly artisanal fishermen, collectors/pickers of mollusks and crustaceans, divers, or communities and social groups that depend directly or indirectly on marine areas for their livelihood. Identify if there are organizational and representative structures of the community groups and list them. Identify conflicts of identified groups with other existing activities in the coastal zone.
b) Carry out an opinion survey on the installation of the enterprise in the communities directly and indirectly affected.

6.3.1.2. Basic and Services Infrastructure

a) Characterize the condition, services and infrastructure existing in the coastal region of the municipality of the study area, as well as the demands regarding

the services of (i) leisure; (ii) sewage collection and treatment; (iii) water supply; (iv) education and level of education of the population; (v) communication; (vi) health and diseases; (vii) security; (viii) collection and disposal of solid waste; (ix) marketing of fishing and seafood products.

6.3.2. Economic Dynamics

a) Present the following indicators: economically active population, municipal unemployment rate and unemployment rates.

6.3.2.1. Productive Activities

a) Identify and geospatialize the occupation of the marine space by the various productive activities, including the proposed location for the enterprise.
b) Present a characterization of the fishing activity, identifying and geospatializing the activities and fishing routes carried out in the study area, both industrial and artisanal.
c) The artisanal fishery should be characterized by a focus on the fishing communities using the study area as a fishing area or for transit from the community to their respective fishing areas, presenting: (i) total number of fisherman; (ii) fishing gear used and its target species; (iii) characterization and quantification of the fleet of each community, classifying as to the type of fishing practiced and as to the distances traveled to the fishing areas; (iv) mapping of the fishing areas of each community and their transit routes; (v) characterization and location of the fish landing points used by a community, as well as the infrastructure used by a community to prepare their fisheries (fuel supply points; ice; sale and maintenance of nets and other fishing gear used, such as line and hook, among others; etc.) (vi) estimated annual production by target species, period and by fishing gear in each community. Present economic indicators related to the activity (jobs, income or other relevant indicators), in addition to government programs of encouragement or development, initiatives or articulations of the private sector.
d) Characterize, if any, non-boarded fishing, in shipwrecks and artificial reefs, informing: (i) time of year; (ii) frequency; (iii) methods used; (iv) target species; (v) contribution to whole local production; (vi) possible use conflicts of the shipwreck.
e) Geospatialize and characterize aquaculture activities, if any.

f) Geospatialize and characterize activity of shellfish collection, if any, informing: (i) time of year; (ii) target species; (iii) areas of use; (iv) characteristics of the involved social groups.
g) Geospatialize and characterize the activity of diving and/or amateur fishing, informing the existence of underwater fishing.
h) Characterize the tourist activity/potential, if any, presenting: (i) economic indicators related to its exploitation (jobs, income or other relevant indicators); (ii) time of year; (iii)location and description of tourist attractions; (iv) presence of water sports; (v) floating population and occupancy rate by season; (vi) government promotion programs, private sector initiatives or

articulations; (vii) available infrastructure; (viii) identify proposed activities compatible with the enterprise that may be developed.

i) Identify and geospatialize the maritime navigation routes, describing the volume of cargo, vessel dimensions and relevance to the region.

6.3.2.2. Municipal collection

a) Present tax collection data of the municipalities of the study area, updated to at least the fiscal year before the study protocol, and characterized by sector of the local economy.

6.3.3. Territorial Dynamics

a) Identify and geospatialize the population settlements and public equipment (schools, health centers, among others) intercepted or located in the surroundings of the roads and terrestrial support structures, which will be used by the enterprise in the implementation phase.
b) Identify and geoespatialize the land use in the perpendicular land coastline to the marine polygonal of the Study Area, discriminating the localities for housing, tourism, leisure, urban commercial use areas, port polygonal and/or private terminals, and other uses for local territorial dynamics.
c) Identify the passage of export cables on land, characterizing the surrounding activities and identifying affected groups/institutions.

6.3.4. Socio-cultural dynamics

6.3.4.1. Historical, Cultural and Archeological Heritage

a) Identify the historical, archaeological and/or cultural interest sites in the Study Area, also considering those that are in the process of being recorded as a historic site in the federal, state and municipal scope.
b) Identify, characterize and contextualize intangible cultural assets, indicating the communities associated with them.

6.3.4.2. Traditional Communities

a) Present a mapping with the location of indigenous communities, quilombola[1] communities and other traditional communities, as defined by Decree Nº 6040 of February 7, 2007, containing the distances between the identified locations and ADA.
b) Present the results of public meetings with the participation of entities representing artisanal fishermen in the enterprise's area of influence. In cases deemed pertinent, IBAMA will promote new meetings or public hearings after the protocol of the studies.

[1] T.N. Quilombola is an afro-Brazilian that live in a Quilombo which were settled by fugitive slaves in Brazil.

6.3.5. Landscape Dynamics

a) Characterize the landscape by analyzing the evolution of the geographical and historical context of the occupation in the last 50 years in the municipalities of the Study Area.
b) Highlight the physical attributes of the coastline that interface with the perception of the undertaking in the landscape.
c) Present research on the perception of interference on the local landscape and on the positive and negative aspects of the undertaking, using visual impact modeling and landscape simulations on the occupied areas and offshore tourist attractions, it is advisable a media presentation that allows virtual simulation of the approach effect of the towers.

6.4. Integrated Analysis of Environmental Diagnosis

a) Highlight, in a synthetic way, the sensitive environmental issues of the region that were identified in the sectorial diagnoses, such as: existence of migratory routes or vital areas for reproduction or feeding of the fauna, relation between the risk of collision of the avifauna and periods of reduced visibility or other extreme climatological events, existence of ecological corridors or fragments of vegetation of great value for the preservation of biodiversity, presence of contaminated sediments, sensitivity of the type of bottom, existence of traditional communities, fishing areas, among others.
b) Perform an analysis containing the relations and interactions between the physical, biotic and socioeconomic environments raised, emphasizing the sensitive environmental issues. This item should, therefore, not consist of a grouping of information collected in each environment.
c) Employ geoprocessing techniques in the integrated evaluation of the different environmental themes, in order to produce an Environmental Weakness Map for the Study Area, based on the Identification Map of Preexisting Multiple Uses, plus relevant diagnostic data. Such a map should support the assessment of the project feasibility, definition of the layout and proposition of preventive and mitigating measures.
d) Present the criteria for determining the relative importance of each theme, focusing on the social and environmental aspects.
e) Consider, at least, the following layers of information in the composition of the Weakness Map (in addition to the relevant layers of the Pre-Existing Multiple Uses Identification Map):

- Benthic Community: rich, vulnerable and poorly resilient habitats.
- Ichthyofauna: breeding, spawning, nursery, shelter and food areas.
- Avifauna: areas for feeding, breeding, nesting, migratory routes and occupation of airspace at risk.
- Marine mammals: areas for feeding, breeding and migratory routes.
- Chelonians: areas for feeding, breeding, nesting and migratory routes.

- Fishing: areas for fishing, shellfish collection, aquaculture, shipwreck, fish landing points.
- Multiple uses: delimitation of the areas used to practice water sports, tourism, tourist attractions.

7. ENTITIES INVOLVED, WHEN APPROPRIATE

7.1. *Secretaria de Vigilância em Saúde* – SVS (Department of Health Surveillance)

When the activity or the enterprise is located in the Legal Amazon or in an area defined by the Ministry of Health as being at risk or endemic to malaria, IBAMA should consult the SVS about TR minutes.

7.2. *Fundação Nacional do Índio* −Funai (Nacional Indian Foundation) Where the activity or undertaking subject to the environmental licensing is located on indigenous land or presents elements that may have a direct social and environmental impact on indigenous land, IBAMA should consult FUNAI about TR minute.

7.3. *Instituto Nacional de Colonização e Reforma Agrária* – Incra (National Institute of Colonization and Agrarian Reform)

When the activity or undertaking submitted to environmental licensing is located on quilombola land or presents elements that may cause direct socio-environmental impact on quilombola land, IBAMA must consult the INCRA about TR Minute.

7.4. *Instituto do Patrimônio Histórico e Artístico Nacional* − Iphan (National Historic and Artistic Heritage Institute)

When the area of direct influence of the activity or the undertaking submitted to the environmental licensing is located in area where it was found the occurrence of safegarded cultural assets referred to in Section II of the Art. Caput. 2° of the Interministerial Ordinance N° 60/2015, IBAMA should consult the IPHAN about TR minute.

7.5. *Instituto Chico Mendes da Conservação da Biodiversidade* −ICMBio (Chico Mendes Institute for Biodiversity Conservation)

When the activity or undertaking affects a specific Federal Conservation Unit or its buffer zone − BZ. The specific studies about the Conservation Unit should be geospatialized and include identification, the characterization and assessment of the environmental impacts of the undertaking or activity relating to the main objectives and attributes of each one of the affected conservation units and their BZ; including the speleological studies within the units, as well as the respective proposals for control and mitigation measures.

ICMBio should be consulted, as provided in CONAMA Resolution Nº 428/2010 and Joint Normative Ruling Nº 8/2019/ICMBio/IBAMA.

When species threatened with extinction and potentially affected by the enterprise are identified, they should be listed and related to the actions of the respective National Action Plans that may have a positive or negative interface with the intended enterprise.

If the project is adjacent to beaches where sea turtles spawn, the Sea Turtle Center - TAMAR/ICMBio, as specified in CONAMA Resolution Nº10/1996, must be consulted.

7.6. State or Municipal Conservation Units Management Bodies

When an activity or undertaking affects an specific state or municipal Conservation Unit or its damping zone, the specific studies on the Conservation Unit should be geospatialized and include the identification, the characterization and the assessment of the environmental impacts of the undertaking or activity relating to the main objectives and attributes of each affected conservation units and their BZ; including the speleological studies within the units, as well as the respective proposals for control and mitigation measures.

8. ANALYSIS OF THE ENVIRONMENTAL IMPACTS

a) Identify, describe and systematically evaluate the environmental impacts generated in the planning, installation and operation phases (normal and abnormal associated with operational deviations, incidents, accidents, etc.) and deactivation of the enterprise or activity, considering the integrality of the project, in the terrestrial and marine environments, its alternatives, the time horizons of impact incidence and indicating the methods, techniques and criteria adopted for their identification, quantification and interpretation. The following are some examples of environmental aspects that are normally evaluated in enterprises of this type. Related to each of them, some effects are presented that should be studied in order to subsidize the listing of the main impacts of each environmental aspect:

Aspect	Effect
Movement of vessels	Effects on turtles and marine mammals, effects on fishing activities.
Noise and Vibrations	Behavioral and physiological effects on different groups of fauna, especially fish, marine mammals and sea turtles. Use sound emission modeling data in the different phases of the enterprise, in combination with the diagnosis of ichthyofauna, chelonians and marine mammals, to estimate the effects on them.
Increase in the turbidity	Effects on the community of planktonic, nectonic and benthic organisms and trophic chains, recreational activities and fishing activities
Changes in seabed and coastline	Effect on benthonic community, trophic chains, erosion of beaches and damage to buildings.
Creation of artificial substrate	Effect on the composition of species, possibility of new resource to establish exotic or invasive species.
Introduction and dispersion of exotic and alien invasive species	Effects on native species populations, considering aspects established in the National Plans for the Prevention, Eradication, Control and Monitoring of Invasive Exotic Species.
Artificial light	Effects on birds, chiropterans, sea turtles and landscape.
Formation of electromagnetic fields	Effects on migration and movement of fish (mainly elasmobranchs), turtles and marine mammals.
Generation of use restriction area	Interference in the trophic chains, fishing activities, tourist, navigation and other uses.
Presence of structures and/or movement of blades	Effects on avifauna and chiropterofauna (mortality, barrier effect, fragmentation, habitat suppression and displacement), tourist activities and coastal communities. Estimate the potential impact of collisions of sensitive or threatened species on their populations, considering quantitative data. Use, for this purpose, collision risk modeling or scientifically accepted methodology. Evaluate the expected effect on coastal communities and tourism potential, using visual impact modeling and landscape simulations on occupied areas and offshore tourist attractions. It is suggested the use of media presentation that allows virtual simulation of the approach effect of the towers.
Change in wind characteristics (Conveyor belt effect)	Reduction in the wind potential of contiguous areas.
Generation of jobs and taxes	Effects on local communities.
Energy Generation	Effect on availability and energy security.

Residues Generation	Effect on water quality and live organisms.

It should be noted that the suggested environmental aspects are exemplifying, and do not exhaust the range of options to be considered, and the entrepreneur is responsible for the verification of the aspects, depending on the specificities of the project and of the area of study.

If dredging is necessary, mathematical modelling of the dispersion of the turbidity plume to be generated at the dredging sites and the disposal of the dredged sediment should be performed in view of the potential for generating impacts, with their respective magnitudes.

b) Analyze the environmental impacts of the project and its alternatives, by means of identification, prediction of the magnitude and interpretation of the importance of the likely relevant impacts, by specifying: positive and negative impacts (beneficial and adverse), direct and indirect, immediate and medium to long term, temporary and permanent; their degree of reversibility; their cumulative and synergistic properties; the distribution of social burdens and benefits.
c) Indicate levels of uncertainty of impacts, based on the availability and quality of diagnostic data and international experience on confirmed impacts of offshore wind typology.
d) Describe the expected effects of the planned mitigation measures in relation to the negative impacts, mentioning those that could not be avoided, and the degree of change expected.
e) Identify the measures to avoid, minimize and/or remedy, always in this order of priority, according to the hierarchy of mitigation and the effectiveness of the measure, at least for the significant negative impacts, in order to make them acceptable. Identify the measures to enhance the important positive impacts.
f) Present compensatory measures for the remaining negative impacts (those resulting from the application of measures to avoid, minimize and/or remedy, or for which there are no applicable mitigating measures, although they are within the limits considered acceptable, and which may be of minor importance).
g) Present tables for the different stages (planning, installation, operation and decommissioning), in which should be included the generating activities, environmental aspects, environmental factors affected, a brief description of each environmental impact and the preventive, mitigating or indicated compensatory measure. It is suggested to organize the impacts from the project components (e.g.
wind power plant, substations, transmission line).
h) Based on the quantitative or qualitative indicators of magnitude chosen for each impact, to subsidize the classification of item "b" above, propose the maximum parameters of acceptable occurrence for each negative impact, as beacons to decision making to be considered when concluding on the socioenvironmental feasibility of the venture.

8.1. Environmental Compensation, envisaged by Sistema Nacional de Unidades de Conservação − SNUC (National System of Conservation Units)

8.1. Environmental Compensation, provided for in the *Sistema Nacional de Unidades de Conservação* −SNUC (National System of Conservation Units)

The Environmental Compensation Plan, as determined by IBAMA Normative Instruction Nº 08/11, must be presented and it should contain:

- Necessary information to calculate the Degree of Impact, in accordance with the specifications contained in Decree Nº 6,848/2009 and IBAMA Execution Norm Nº 1/2017; and
- Indication of the Conservation Units to be benefited with the resources of the environmental compensation or proposal for the creation of new Conservation Units, considering what is foreseen in Art. 33 of Decree Nº 4.340/2002, in Art. Nº 9 and Nº10 of Resolution CONAMA Nº 371/06 and the guidelines and priorities established by the Federal Chamber of Environmental Compensation.

9. AREA OF ENVIRONMENTAL INFLUENCE

a) Define the boundaries of the geographical area to be directly or indirectly affected by the impacts, called the influence area of the project, considering, in relation to the terrestrial component, the river basin in which it is located.
b) Identify, characterize, georeference and map the determinants for the delimitation of the influence areas.
c) Consider the data obtained and the impact analysis when defining the areas of influence.
d) Present, in shapefile format, the limits of the areas of influence, by means (physical/biotic/socioeconomic).
e) Distinguish the areas of influence as follows:

9.1. Directly Affected Area − DAA

Area where the activity will be carried out or where the structures of the enterprise are located, including the ancillary structures. (e.g. construction sites, lodgings, port areas). This area is not defined from the impacts.

9.2. Direct Influence Area − DIA)

Area subject to direct, actual or potential impacts during all phases of the undertaking/activity, normally differentiated for each of the means considered (biotic, physical and socioeconomic). Its delimitation shall be based on the scope of direct impacts of the undertaking on the socioeconomic, physical and biological characteristics of the systems to be studied and on the particularities of the

undertaking/activity, including complementary works, such as water catchment, access roads and campsites.

9.3. Area of Indirect Influence − AII

This area is subject to indirect impacts, real or potential, during all phases of the enterprise/activity, normally differentiated for each of the means considered (biotic, physical and socioeconomic). Its delimitation should be based on the extent of the indirect impacts of the enterprise/activity on the socioeconomic, physical and biological characteristics of the systems to be studied and the particularities of the enterprise/activity.

10. ENVIRONMENTAL RISK ANALYSIS

The consequences of the malfunction of the undertaking may be more significant than the impacts caused during the normal operation of the undertaking. That way, the Environmental Risk Analysis is foreseen, aiming to identify the main risks of the venture to the environment and the external community. Therefore, the identification of risks to workers and property is not the focus of this study.

The environmental risks can be of the natural type (storms, lightning, floods, sliding, silting, among others), acute technological (explosions, leaks, among others), or chronic technological (treatment plant malfunction, among others).

The Environmental Risk Analysis should include the following stages:

- Display the location of the development and its units on a map with appropriate resolution and scale.
- Present brief and objective description of the area of influence, using maps whenever possible, highlighting: (i) meteoceanographic data, (ii) water bodies, (iii) populated areas surrounding the development, (iv) environmentally sensitive or protected areas, (v) economic and/or extractive activities, among others, that may be affected in the event of an accident of the undertaking.

<u>Installation Stage</u>

- Describe the activities involving the handling of dangerous products, such as: oil storage, machinery fueling, vessels fueling, removal of oily waste, among others, correlating with the areas indicated in the layout of the project.
- Present a history of environmental accidents in the last 20 years in similar enterprises. For each accident involving spillage of hazardous product, inform the total volume spilled, total volume collected, affected areas and response actions taken, if such information is available.
- List the manipulated dangerous products and their respective UN classification. The list must include, among others, fuels, goods and waste,

when relevant. *The Fichas de Informação de Segurança de Produto Químico* – FISPQs (Chemical Product Safety Data Sheets – CPSDSs) of the identified dangerous products must be sent in digital annex.

- Describe other activities developed during the installation of the enterprise that may present risks to the environment or the external community.
- Present Preliminary Hazard Analysis − PHA in spreadsheet format, covering both intrinsic equipment, instrument and material failures, as well as operational errors. The PHA shall identify hazards, causes and effects (consequences).
- Classify each hazard into frequency and severity categories according to the following model.

Table 2 - Frequency categories of occurrence of identified hazards

Category	Denomination	Description
A	Remote	It is not expected to occur.
B	Unlikely	Expected to occur up to one time.
C	Likely	Expected to occur a few times.
D	Frequent	Expected to occur several times.

Table 3 - Severity categories of identified hazards

Category	Denomination	Description
A	Low	Contamination near the leak source, volume less than 200 liters (one drum), natural degradation or local manual cleaning of the substrate (absorbing material). Nuisance to members of the outside community.
B	Medium	Contamination spreads, but remains inside the facility or in its vicinity, volume from 200 to 1000 liters, natural degradation or local manual cleaning (absorbent material). Minor injuries to members of the external community.
C	High	Contamination spreads away from the source of the leak, reaching areas external to the installation, volumes of thousand to 8 thousand liters, need to carry out containment operation and mechanical and manual retrieval and/or cleaning of the affected areas. Moderate damage to members of the outside community.

D	Catastrophic	Contamination spreads, reaching extensive area (bay, estuary, another municipality), volumes above 8 thousand liters, need to carry out containment operation and mechanical and manual gathering and cleaning of the affected areas. It causes death or serious injury to members of the external community.

- Elaborate matrix establishing the relation between frequency and severity, in order to identify the level of risk, according to the model below.

Table 4: Risk matrix

		Frequency			
		A	B	C	D
Severity	D	3	4	4	4
	C	2	3	4	4
	B	1	2	3	4
	A	1	1	2	3

Severity	**Frequency**	**Risk**
A – Low	A - Remote	1- Low
B- Medium	B - Unlikely	2- Moderate
C- High	C- Likely	3- Serious
D - Catastrophic	D - Frequent	4- Critic

- Present spreadsheet containing the identified hazards, their classification as to frequency, consequence and level of risk, as well as the preventive and/or mitigating actions, which should be detailed in the Risk Management Program.
- Present conclusion considering the tolerability of the risks detected due to the socio-environmental sensitivity of the enterprise area.

Operation Stage

- Describe the main activities related to the operation phase, indicating in the layout of the undertaking the locations where the actions will be carried out.
- Present a history of environmental accidents in the last 20 years in similar enterprises. For each accident involving spillage of dangerous product, report the total volume spilled, total volume collected, affected areas, and response actions taken, if such information is available.

- Describe operations involving the handling of dangerous products such as: oil storage, machinery refuel, vessels refuel, removal of oily waste, among others, correlating with the areas indicated in the layout.
- Describe other activities developed during the operation of the enterprise that may present risks to the environment or the external community.
- Present Preliminary Hazard Analysis − PHA in spreadsheet format, covering intrinsic equipment, instrument and material failures, as well as operational errors. In the PHA should be identified hazards, causes and effects (consequences).
- Sort each hazard into frequency and severity categories according to the tables and figures presented for the installation phase.
- Present spreadsheet containing the identified hazards, their classification as to frequency, consequence and level of risk, as well as the preventive and/or mitigating actions, which should be detailed in the Risk Management Program.
- Present conclusion considering the tolerability of the risks detected due to the socio-environmental sensitivity of the enterprise area.
- List the dangerous products handled and their respective UN classification.

The list should include, inter alia, fuels, goods and waste, where relevant. The *Fichas de Informação de Segurança de Produto Químico* − FISPQs (Chemical Product Safety Data Sheets) of identified hazardous products shall be enclosed in digital media only.

10.1 Environmental Risk Management and Emergency Response

Based on the identified risks, the proposal of the Risk Management Program − RMP should be presented, including the installation and operation phase of the venture. The RMP should contain, for each stage, a description of the activities involving the identified risks (e.g., machinery fueling procedures), preventive measures to avoid accident (e.g., measures to prevent the fuel from leaking during refueling) and Emergency Plan, with response structure to meet the identified accident scenarios. If the undertaking is viable, the RMP should be detailed at a later stage.

11. ENVIRONMENTAL MANAGEMENT PLAN

a) Conceptually present the plans, programs and measures to be adopted in all phases of the enterprise to avoid, mitigate or compensate for adverse impacts and enhance beneficial impacts, indicating the factors and parameters to be considered.
b) Propose monitoring and follow-up programs (positive and negative impacts), using predefined indicators, in order to verify the effectiveness of the measures and the occurrence of the impact, as well as establish the actions to be taken. Preliminarily, the following programs are indicated, highlighting that this list should be expanded with the programs that mitigate or compensate the impacts identified in the EIS analysis:

	Environmental Programs	Subprograms	Execution phase	
			Installation	Opera
01	Construction Environmental Plan	Access, Security and Signage	X	
		Emergency Attendance	X	
		Good construction practices	X	
		Control of atmospheric emissions	X	
		Control of erosive processes and silting	X	
		Noise and vibration control	X	
		Control of photopollution	X	
		Demobilization of workforce	X	
		Solid waste and effluent management	X	
		Management and control of vessel traffic	X	
		Minimization of vegetation suppression	X	
		Prevention of soil and water contamination	X	
		Others	X	
02	Solid Waste and Effluent Management Program			X
03	Noise and Vibration Monitoring Program		X	X
04	Degraded Areas Recovery Program		X	
05	Disturbance and Rescue of Fauna		X	
06	Project for Prevention and Control of Exotic Species		X	X
07	Biota Monitoring Program	Benthos	X	X
		Fishes	X	X
		Marine turtles	X	X
		Birds	X	X

		Bats	X	X
08	Social Communication Program		X	X
09	Environmental Education Program	Component I – Social groups in the area of influence	X	X
		Component II – PEAT (Workers)	X	X
10	Risk Management Program / Emergency Action Plan		X	X

12. CONCLUSON

a) Characterize the future environmental quality of the area of influence by comparing the different situations of adoption of the project and its alternatives, as well as the hypothesis of its non-realization and consider the proposition or existence of other undertakings in the region.
b) Indicate clearly, objectively and impartially, focusing on significant environmental impacts, whether, from the studies and implementation of the programs and measures by the entrepreneur, the undertaking/activity has environmental viability or not.

The conclusion should not consider actions and measures of third parties for the purpose of attesting the environmental viability of the undertaking/activity.

13. REFERENCES

a) List the references used to carry out the studies, according to the current norms of Associação Brasileira de Normas Técnicas – ABNT (Brazilian Technical Standards Association).

14. GLOSSARY

a) List the technical terms used in the study with their respective meanings.

15. *RELATÓRIO DE IMPACTO AMBIENTAL* −RIMA (ENVIRONMENTAL IMPACT REPORT)

a) Present the Rima objectively and appropriately for an easy understanding. The information should be translated into accessible language, illustrated by maps, charts, graphs and other visual communication techniques, so that the advantages and disadvantages of the project can be understood, as well as all the environmental consequences of its implementation. Its minimum content is determined in Art. 9º of Resolution CONAMA 01/1986.