

1. Introduction

The purpose of this report is to present the environmental component of the Technical, Economic and Environmental Feasibility Study (EVTEA) of the lease area known as **SUA05**, located in the Suape-PE Port Complex, for the purpose of implementing a new container terminal.



Figure 1. Location of the Suape Port Complex Source: Own elaboration, from the Master Plan (2012)

The preliminary environmental study aims to subsidize the assessment of the relevant environmental aspects associated with the development of port activities under the lease. The evaluation is carried out based on the applicable environmental legislation and the situation of the area covering the following topics:

- Description of the Lease Area;
- Environmental Licensing;
- Definition of the Environmental Study Required for Licensing;
- Documentary Analysis;
- Evaluation of Potential Environmental Liabilities;
- Identification of Major Environmental Impacts;
- Proposal of Environmental Programs; and
- Estimation of Environmental Costs.

Based on this evaluation, as well as on the project proposal for occupation of the area and on the current legislation, the environmental licensing process will be foreseen for the project and the proposal of



environmental control and management measures or, where appropriate, compensatory measures to be adopted by the future tenant.

From the conclusion of the analyzes and proposition of solutions coming from the diagnosis of the area of interest, the estimation of the costs associated with the licensing process and the environmental management was carried out.

2. Description of the Lease Area

The **SUA05** lease area is located within the polygon of the Suape Port Complex, in the section called "inner port," in the mainland of the Port, in front of the Atlântico Sul Shipyard, located on the opposite bank of the port channel.

The terminal is designed to handle and store containerized cargoes, consisting of a dock of 770 meters (with 2 berths for mooring, piers 6 and 7) and with a back area of approximately 268,967 m² with possibility of expansion.

It is worth noting that in the business model, the expansion of the Terminal is included in the contractual draft, with 163,735 m² of area and 430 linear meters of quay, which will be subject to future licensing, not being addressed in this study.

The land on which the project is to be built consists of an old boot, with predominantly sandy material, easy to drain, poor in organic matter and, consequently, difficult to establish vegetation. Despite this, there are plant populations adapted and tolerant to the terrain conditions, forming an open field vegetated environment with herbaceous cover. In the environment, in addition to the herbaceous plants, 36 young saplings of four species were identified 22 *Casuarina equisetifolia*, 12 *Leucaena leucocephala*, 1 *Syzygium cumini* and a tree whose species was not identified. All species found are invasive exotic species.

The Terminal is planned to be implemented in a greenfield area, involving the execution of dredging, construction of berths for mooring and storage yard, as well as the acquisition of equipment for handling containers. The terminal will have capacity limits to move approximately 840,000 TEU (unit of measurement equivalent to 20 feet) per year.

It should be noted that the activities carried out in the **SUA05** lease area are in line with the definitions of the Development and Zoning Plan – PDZ (02/2010) in force at the Suape Port Complex.





Figure 2. Location of the **SUA05** lease area in the port of Suape Source: Own elaboration, from Google Earth (2018)

3. Environmental Licensing

The entire environmental licensing procedure of the Port of Suape was carried out by the State Environmental Agency – CPRH.

For this Terminal, the CPRH issued the Preliminary License (LP) No. 19.16.09.004071-2, in force until 07/10/2018, which indicates feasibility for the implementation of a new container terminal, with an area of 320,000 m², called **SUA05** for lease purposes.

It should be emphasized that the current back area to be used for the implementation of the project is smaller than that defined the LP and is inserted in this one.

The installation license (LI) No. 01.15.05.002231-2 was issued, effective until 11/05/2019, which authorizes the implementation of the 6th and 7th mooring berths (piers 6 and 7), as well as the Authorization No. 04.17.09.003229-1 of dredging of berths 6 and 7, in force until 21/09/2018, with a total estimated volume of 3,918,729.25 m³ of sand, silt and clay, 1,567,516.90 m³ of sand destined for hydraulic landfill and 2,351,275.35 m³ of fine material that was destined for the ocean disposal area.

The Suape Port Complex has Operation License (LO) No. 051605002289-8, effective until 20/06/2012, which authorizes the operation and management of the Industrial Port Complex. The environmental conditions and controls established in the LO are applied to all public areas of the Port, as is the case of the container terminal under analysis.

Currently, the rental area **SUA05** is included in the following programs carried out by the Port:

• Solid Waste Management Program – PGRS and Waste Inventory;



- Environmental Education Program;
- Pest and Vector Control Program;
- Potable Water Quality Monitoring Program;
- Environmental Noise Monitoring Program;
- Risk Management Plan (PGR);
- Emergency Response Plan (PAE);
- Individual Emergency Plan (PEI).

The Port does not generate industrial effluent, only sanitary, that is launched in septic tanks or disposed in vacuum trucks in treatment plants.

In addition, every year, the Port of Suape carried out an Environmental Audit in accordance with the CONAMA resolution no. 306/2002, including all its facilities, the last one being held in December 2017.

4. Definition of the Environmental Study Required for Licensing

This topic aims to indicate the guidelines regarding the environmental licensing process, considering the characteristics of the proposed enterprise, relating information about the necessary documents to the beginning or continuation of the licensing process corresponding to the licenses to be required.

The indication of the procedures related to environmental licensing was based on premises that involve the analysis of the following items:

- Activities currently carried out in the area;
- Existing Environmental License or exemption from previous licensing;
- Environmental agency responsible for issuing licenses;
- Proposed operational and structural changes to the area to be leased;
- Current situation of the area;
- Legal framework.

Therefore, the following characteristics of the project to be licensed must be taken into account:

- This is a greenfield area, located in the backyard of old dredges, which should receive new facilities;
- Construction of two berths, dredging activities, installation of equipment and back area;
- Environmental licensing was carried out with the CPRH.

From the analysis of Decree No. 8,437, dated April 22, 2015, however, it is understood that, at present, the competence to define the necessary studies and the environmental requirements related to the environmental licensing of this enterprise rests with the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) and the CPRH.

The said Decree No. 8,437, dated April 22, 2015, assigns to the federal environmental agency (IBAMA) the licensing of port facilities with a handling of more than 450 thousand TEU/year (article 3, V), and according to article 4, the "processes of licensing and environmental authorization of the activities and undertakings



referred to in article 3, started before the publication of this Decree, shall be kept before the original organs until the end of the operation license, whose renewal shall be incumbent upon the competent federal entity, pursuant to this Decree."

For the case in question, regarding the application for the Installation License for the continuity of LP No. 19.16.09.004071-2, which was issued by the CPRH, the LI should be requested to IBAMA; since the Terminal will have capacity limit to handle approximately 840 thousand TEU per year, thus exceeding 450 thousand TEU/year, as provided in the Decree. At this stage, IBAMA may request the engineering project, the Basic Environmental Plan, the fulfillment of the conditions of the LP and the updates or complements of the environmental study, if such a body deems necessary.

Regarding the request to IBAMA for Authorization to Suppress Vegetation, it is assessed not to be necessary, since it is an already altered area, occupied by secondary vegetation and that the small amount of tree species to be suppressed does not entail the elaboration of forest inventory. However, it is necessary to submit technical justification on the subject, if requested by IBAMA.

In the case of LI No. 01.15.05.002231-2, its renewal should be requested in the CPRH itself, since case No. 000970/2014 was filed with this Agency on January 22, 2014, before the Decree No. 8,437/2015. For this renewal, the CPRH may request the engineering project and the updates or supplements of the environmental study, if such a body deems necessary.

As for the Authorization No. 04.17.09.003229-1, referring to the dredging activity, the renewal should be requested in the CPRH.

On the other hand, it is understood that the LO of the **SUA05** lease area, to be requested in IBAMA, will consider the berths 6 and 7 and the back area. In order to obtain the LO, it is necessary to submit a Monitoring Report of the Implementation and fulfill the conditions of the LI.

5. Documentary Analysis

The methodology of evaluation of the areas of interest is based on the compilation, systematization and analysis of environmental information made available and surveyed through:

- Related environmental liabilities;
- Evaluation of documentation and data collection: evaluation of available documentation, including environmental licenses and other documents that contain obligations, conditions and requirements related to the environmental issue and that are directly related to the activities currently or to be developed in the area;
- Survey of relevant environmental data and information with the Port Authority of Suape Port.

The following table shows the environmental licensing documentation for the **SUA05** area.



Section F - Environment							
Document Identification	Responsible Body	Subject Matter	Date of Issue	Validity			
Preliminary License No. 19.16.09.004071-2	CPRH	Preliminary License Subject Matter: Implementation of a new Container Terminal – TECON II (SUA05)	07/10/2016	07/10/2018			
Installation License No. 01.15.05.002231-2	CPRH	Installation License Subject Matter: Installation of the sixth and seventh mooring berths (piers 6 and 7)	12/05/2015	11/05/2019			
Authorization No. 04.17.09.003229-1	CPRH	Authorization Dredging, desanding and earthworks: volume above 70,000 m ²	21/09/2017	21/09/2018			
Renewal of Operation License No. 05.16.05.002289-8	CPRH	Operation License Subject Matter: Operation and management of the Suape industrial port complex, terrestrial and oceanic disposal and central solid waste sorting.	21/06/2016	20/06/2021			
Technical Note No. CGAP 1/2018	SUAPE Port	Reports on licenses and environmental programs for vehicle terminals and Container Terminal	19/03/2018	-			

Figure 3: Documentation of the lease area SUA05

Source: Own elaboration, from information collected

6. Evaluation of Potential Environmental Liabilities

6.1. Methodology

6.1.1. Area of Interest Classification

In order to standardize the classification of the area with regard to environmental liabilities related to contaminated areas, the assumptions presented in CONAMA Resolution 420/2009¹, Standard ANBT NBR 15515-1/2007² were considered: Environmental Liability in Soil and Groundwater – Part 1: Preliminary Assessment and North American Standard ASTM E 1527-05 Environmental Site Assessments: Phase I Environmental Site Assessment Process and in CETESB Standard 103/2007/C/E, 2007. It should be noted

¹ CONAMA Resolution No. 420/09, establishes criteria and guiding values of soil quality for the presence of chemical substances and establishes guidelines for the environmental management of areas contaminated by these substances as a result of anthropic activities.

² Standard ABNT NBR 15515-1/2007: Environmental Liability in Soil and Groundwater - Part 1: Preliminary Assessment, establishes the minimum procedures for preliminary assessment of environmental liabilities aiming at the identification of evidence of contamination of soil and groundwater.



that this Standard updates and complements the provisions of Chapter 5000 – Preliminary Assessment of the Contaminated Areas Management Manual (CETESB, 2001)³.

Thus, according to CETESB Standard 103/2007, the following definitions may apply to the area of study:

- **Potentially Contaminated Area (PA):** these are areas where potentially contaminating activities are being or have been developed, that is, where the handling of substance whose physical, chemical, biological and toxicological characteristics can cause damage or risks to human health and other goods to be protected;
- **Suspected Contamination Area (AS):** these are areas in which, after the preliminary Environmental Assessment was carried out, evidence has been obtained that leads to suspicion of the presence of contamination in the area or its surroundings;
- **Contaminated Area Under Investigation (AI):** these are the areas where there is evidence of the presence of contaminating products, or when there is a presence of substances, conditions or situations that, according to specific parameters, may represent a danger;
- Area Excluded from Registration: these are areas that, based on the findings raised in the Preliminary Assessment, do not present evidence that may refer them to the classification of Potentially Contaminated Area (AP), thus, failing to receive this classification.

6.1.2. Potential Contamination Sources

- Leakage/Infiltration: a mechanism for the physical transfer of a liquid or gas from one medium to another of a product with potentially polluting potential, improperly conditioned or by an incident or environmental incident, which can leak or penetrate a containment barrier (including the floor) reaching the soil layer or the ground/surface water;
- **Perceptible Indicators:** visual and/or olfactory evidence of the occurrence of the release of elements/compounds with potential for pollutants or contamination of the environment or that pose risks to human health;
- **Primary Source:** facility or material from which the contaminants originate and have been or are being released to impacted media;
- **Secondary Source:** means impacted by contaminants from the primary source, from which other means are impacted;
- **Target Compounds:** elements and/or chemical compounds of interest that may be present in the area in order to integrate a scenario of possible risk to human health or the local ecosystem.

³ Contaminated Areas Management Manual (CETESB, 2001), a compendium of guidelines for the execution of environmental procedures for Preliminary Environmental Assessment studies, Confirmatory Environmental Investigation, Detailed Environmental Investigation, Toxicological Risk Assessment for Human Health and Contaminated Area Remediation Processes, promoted in Brazil-Germany technical cooperation between the Environmental Company of the State of São Paulo (CETESB) and Deutsche Gesellschaft für Technishe Zusammenarbeit (GTZ) Gmbh.



6.1.3. Environmental Risk Evaluation

Environmental Risk can be defined as the probability of environmental impact occurring. The purpose of the risk analysis is to diagnose, evaluate and manage the risk posed to the environment and man, aiming to prevent the occurrence of accidents and the generation of environmental liabilities.

The evaluation of the environmental risk presented here was carried out using the assumptions of the methodology adapted from FMEA (Failure Mode and Effects Analysis) or, as translated by the Brazilian Association of Technical Standards (ABNT), Análise dos Modos de Falha e seus Efeitos. FMEA is a method that uses quantitative variables to perform an analysis of possible failure modes that may occur in processes or products. The risk resulting from the evaluation of scenarios of possible environmental contamination is classified considering a matrix that includes the assessment of probability of occurrence of environmental damages and the degree of severity of the possible consequences, resulting in a degree of risk that can be classified as very low, low, medium high or very high. The matrix that synthesizes this evaluation is presented in the following figure.

RISK CLASSIFICATIC)N						
Very High Risk		SEVERITY OF DAMAGES					
High Risk							
Medium Risk		D4:Lel	Madarata	Sauara	Critical	Catastranhis	
Low Risk		IVIIIQ	Moderate	Severe	Critical	Catastrophic	
Very Low Risk							
	Imminent/Practically certain						
	Probable and measurable with sufficient safety						
PROBABILITY OF DAMAGES	Probable and NOT measurable with sufficient safety						
	Possible						
	Remote						

Figure 4. Matrix of environmental risk assessment and generation of liabilities Source: Port Lease Program – PAP

For the environmental risk assessment of the area of interest, the following parameters are evaluated to allow its classification.

6.1.3.1 *Probability of Damages*

- Imminent/Practically Certain: environmental damage apparently certain, with a high chance of happening or that can happen at any moment, although it did not occur;
- **Probable and Measurable with Sufficient Safety**: environmental damage and damage to the company image may occur when the chance of occurrence is greater not occurring. And when measurable with sufficient safety;



- **Probable and NOT Measurable with Sufficient Safety**: environmental damage and damage to the company image may occur when the chance of occurrence is greater not occurring. But when NOT measurable with sufficient safety;
- **Possible**: when the chance of environmental damage and damage to the company's image occurs is less than probable, but greater than remote;
- **Remote**: when the chance of environmental damage and damage to the company's image occur is small.

6.1.3.2 *Severity of Damages:*

- **Mild**: negligible environmental impact;
- **Moderate**: controllable environmental impact, restricted to the project area;
- **Severe**: environmental damage restricted to the area of the enterprise that requires immediate recovery actions with a duration of less than one (1) year;
- **Critical**: environmental damage that can reach areas outside the facility that requires immediate recovery actions lasting more than one (1) year;
- **Catastrophic**: environmental damage that reaches areas within the facility and causes serious ecological imbalances. Requires immediate action.

6.2. Area of Interest Diagnosis

The following are the evaluated criteria for the classification of the area denominated **SUA05** regarding the probability of contamination.

6.2.1. Declaration of Environmental Liabilities

An environmental liability should be recognized when there is an obligation on the part of the company to incur costs related to the promotion of recovery, restoration, closure or withdrawal actions. After being aware of the liabilities, this must be declared to the body so that the necessary actions can be carried out.

Regarding the **SUA05** area, it was verified that the terminal area does not have declared environmental liabilities.

6.2.2. Area of Interest Classification

Considering that the area under study does not present evidence that may refer to the classification of Potentially Contaminated Area (AP), then it should be classified as: Area Excluded from Registration.

6.2.3. Potential Contamination Sources

No potential sources of contamination have been identified at the moment.

However, the analyzes performed in this study demonstrate that during the implementation and operation of the project, there is a reduced possibility of accidents occurring in the terminal.



6.2.4. Possible Conflicts with Activities or Occupation in the Surroundings

The areas surrounding the Terminal are predominantly occupied by port activities, and road accesses, being unlikely the conflict due to occupation or inappropriate use of third party area.

6.3. Environmental Risk of the Area of Interest

Considering the operating conditions and structures in the **SUA05** area, we consider the area with: Probability of Damages: POSSIBLE and Severity of Damages: MILD, due to the characteristics of the activities to be developed in the area, as shown below.

RISK CLASSIFICATIO	ON							
Very High Risk		SEVERITY OF DAMAGES						
High Risk								
Medium Risk		D4:Lel	Madarata	Savara	Critical	Cotostrophia		
Low Risk		IVIIId	Moderate	Severe	Critical	Catastrophic		
Very Low Risk								
Probability of Damages	Imminent/Practically certain							
	Probable and measurable with sufficient safety							
	Probable and NON-measurable with sufficient safety							
	Possible	X						
	Remote							

Figure 5. Matrix of environmental risk assessment and generation of liabilities for the **SUA05** area Source: Own elaboration, based on the Port Lease Program – PAP

From the above, based on the documentary information collected, the area was classified as an Area Excluded from Registration. Based on the operational activities and the physical structures of the Terminal, the area with probability of damage is considered: possible and the severity of damages: mild, resulting in a very low risk classification.

7. Identification of the Main Socio-Environmental Impacts

The evaluation of aspects and impacts related to the different phases of the project allows the definition of mitigation measures of negative impacts, as well as the proposal of programs that can gather preventive, control, monitoring or compensatory measures.

It should be noted that this analysis does not exhaust all environmental aspects that may be considered by the environmental agency in the licensing process. After elaboration of more detailed studies and based on



the Term of Reference issued by the competent body, a specific impact assessment must be carried out for the enterprise.

In general, the main socio-environmental impacts related to the implementation, dredging and operation of a container terminal are listed below.

Importe			Phases				
impacts	I	0	D				
Generation of Solid Waste and liquid effluents	х	х					
Air pollution	Х	Х					
Sound pollution	Х	Х					
Proliferation of harmful synanthropic fauna		Х					
Generation of employment and income	Х	Х	Х				
Change and disruption in the daily life of the population	Х	Х					
Incompatible practices of workers involved in installation and operation	Х	Х	Х				
Hazardous Product Accident Risk		Х					
Soil Contamination and Waterproofing	Х	Х					
Erosion in marginal areas	Х						
Water bodies sedimentation			Х				
Formation of sediment plumes			Х				
Loss of plant cover	Х						
Disruption and frightening of terrestrial fauna	Х						
Alteration of water quality and generation of suspended sediment			Х				
Change in local hydrodynamics			Х				
Interference in aquatic biota in pelagic, demersal and benthic organisms			Х				
Reduction of the fishing stock and conflicts caused by the alteration of the fish stock			Х				

Figure 6: Impacts related to the stages of implantation (I), dredging (D) and operation (O) of the **SUA05** Source: Own elaboration, based on area's features

The relevant impacts resulting from the implementation, dredging and operation of the enterprise are as follows:

7.1. Generation of Solid Waste and Liquid Effluents

The main solid waste generated in the process of implementation and operation of the Terminal should be classified in classes I and II of NBR 10.004/2004:

- Class I Hazardous
- Class II Non-Hazardous

Waste classified as Class I – Hazardous – is generated in the processes of preventive and corrective maintenance of critical equipment, with oily residues among others, and other residues such as lamps, building maintenance residues, alkaline batteries, among others.



Class II wastes are non-polluting and may be inert or non-inert, such as leftovers, paper and cardboard waste, wood waste and textile materials, among others.

The effluents generated in the activities of the terminal are related to domestic sewage, rainwater and possible leaks and oil spills from the machines and equipment during the installation and operation of the project. The risk of contamination lies in possible leaks from the containers, for which adequate prevention and control actions should be provided.

7.2. Air Pollution

In the phase of implementation of the new structures and in the operation, the emission of particulate is expected in the fronts of service.

During the operation of the terminal there are atmospheric emissions from fossil fuel-based machinery and equipment and vehicles, in addition to fugitive emissions of volatile gases.

7.3. Sound Pollution

Due to its implantation and operation, the terminal generates an increase in noise levels, mainly related to the traffic of trucks and vehicles.

7.4. Proliferation of Harmful Synanthropic Fauna

The activities of the terminal can generate accumulation of residues and conditions conducive to the proliferation of pests and vectors, such as mosquitoes, cockroaches and rats, with contamination in the various facilities of the port.

7.5. Generation of Employment and Income

The terminal will create direct employment opportunities for a contingent of workers, both in the implementation phase and in the dredging and operation of the enterprise.

In addition, it is necessary to invest in the hiring and training of the local labor force, so that the benefits coming from the enterprise reach the regional population.

7.6. Change and Disruption in the Daily Life of the Population

The lack of communication between the actors involved in the execution of the project, with emphasis on the lessee, port authority, workers, municipality and community, increases the possibility of occurrence of disruptions, and may have negative impacts for the implementation and operation of the Terminal. Another relevant factor to be analyzed is that the change in the flow of people at the project site, during the labor recruitment phase, may result in changes in the daily lives of the population, especially local residents, in addition to the community of artisanal fishermen.



7.7. Incompatible practices of Workers Involved in the Installation and Operation

The lack of training of workers involved in the installation, dredging and operation of the project may have negative impacts on the execution of the activities, including the day-to-day operations of the Terminal, the execution of the planned socio-environmental programs, the relationship with the population of the environment, and endanger the health and safety of those involved.

7.8. Hazardous Product Accident Risk

In view of the diversity of cargoes to be handled at the Terminal, consideration should be given to the possibility of accidents involving dangerous products, such as the spillage of oil and various hazardous chemicals form vehicles and trucks and circulate in the area and, mainly, of the containers to be stored on site. It is therefore a situation that requires not only corrective actions at the time of accidents, but also preventive measures, aimed at reducing risks and impacting consequences, including the possibility of outlets and explosions.

The terrestrial and aquatic environment may be affected by the handling, transport and storage of chemicals. When there is a particularly inadequate storage o containers with heavy metals, synthetic organic materials, hydrocarbons, pesticides and other toxic substances, they can make terrestrial and aquatic ecosystems completely unfit for human consumption.

7.9. Soil Contamination and Waterproofing

Contamination of soils occurs through the infiltration of water from the discharge of highly impermeable and contaminated surfaces. Thus, adequate drainage should attenuate impacts in places where the soil is waterproofed by asphalt or cement. The consequences of the contamination and destabilization of the margins and the transport to the water courses generate contamination of the waters, of the soil and groundwater, facilitating the accumulation of solid waste.

7.10. Erosion in Marginal Areas

Marginal erosion is a serious process of environmental degradation, resulting in a decline in the shipping activities, causing the destruction of riparian areas, damaging the economic sustainability of populations dependent on fishing activities, contributing to the degradation of large areas and producing catastrophic effects on the environment, resulting in the rupture of the environmental balance.

7.11. Water Bodies Sedimentation

Sedimentation is the process in which watercourses are affected by the accumulation of sediments, which results in the excess of material from dredging, considering that the reference area has been used for deposition of sediments.

The sedimentation process usually occurs by flow towards the water bodies, where they are deposited. The deposited sediment is carried by the water bodies and, when it encounters flatter places, where the speed



of the water course is not very accelerated, it deposits in the bottom, accumulating and eventually forming sandbanks along the water course.

The consequences of sedimentation of water bodies may be aggravated, especially if contaminated material is present. Adding to this is the loss of habitat and adequate conditions for aquatic biota, hindering even the reproduction of the species.

7.12. Formation of Sediment Plumes

Dredging activities are intrinsic to the port operation and carried out periodically, in most cases. Dredging can intensify the transport of sediment plumes at a given location, causing economic and environmental impacts.

Sometimes the operations are carried out in estuaries, and environments of high complexity, making predictability of hydrodynamic and sedimentological behavior difficult.

This concern with the estuarine system stems from the importance of its unique environmental characteristics and is responsible for high biological productivity. These ecosystems play important ecological roles, such as exporters of nutrients and organic matter to adjacent coastal waters, vital habitats for species of commercial importance, and generate goods and services for local communities.

Urban settlements, fishing activities, tourist activities, among others, can be affected by the plume of dredged sediments, without due planning and putting at risk the basic attributes of estuaries and associated ecosystems, resulting in the degradation of local quality of life.

7.13. Loss of Plant Cover

As described in the item "Description of the Lease Area," the site under study is a greenfield area formed by an old oceanic boot, with predominantly sandy material, easy drainage, low in organic matter and, consequently, difficult establishment of vegetation. Despite this, we verified the presence of herbaceous cover, formed by plants adapted and tolerant to the conditions of the terrain. In addition, 36 small tree individual belonging to the species *Casuarina equisetifolia*, *Leucaena leucocephala*, *Syzygium cumini* and one unidentified, characteristic of degraded areas were found.

Thus, considering that this area is already altered, occupied by secondary vegetation and with not significant quantitative of trees, it is considered that the impact of the vegetal communities present in the area will be of little relevance, in order not to justify the execution of a program for its mitigation.

7.14. Disruption and Frightening of Terrestrial Fauna

The mobilization of machines and equipment in the area during the realization of the plant suppression will lead to the temporary scaring of the fauna, by the emission of noises. The removal of the vegetation will cause the animals to escape to conserved areas in search of shelter and food.



Plant suppression activity may lead to punctual loss of habitats, as well as nets and burrows may be affected. Species of the avifauna will be less impacted, considering that they have good capacity of movement.

The opening of the vegetation exposes the fauna, and it is important to instruct the workers for this activity. However, considering the above in relation to the little local vegetation, there will probably be no significant impact on the area that might affect the local fauna, so as not to justify the execution of a specific environmental program for its mitigation.

7.15. Alteration of Water Quality and Generation of Suspended Sediment

The dredging activity may cause the water quality to change, considering the increase in the concentration of suspended sediments in the water column, which results in higher levels of turbidity and changes in water color. The change may also occur through the release of contaminants into the aquatic environment.

7.16. Change in Local Hydrodynamics

The variations in the currents along the estuarine channel, marked by intercalated regions of increase and decrease in the intensity of currents, directly affect the propagation of the sediment plume created with the dredging activity, thus requiring monitoring of its movement and effect on the local environment.

7.17. Interference in Aquatic Biota in Pelagic, Demersal and Benthic Organisms

The dredging activity involves the physical removal of oceanic material, and together with this material pelagic, demersal and benthic organisms that occupy these areas end up being sucked and die.

In addition, sediment suspension may modify algal bloom periods or changes in the composition of phytoplankton communities. In the ichthyofauna, it can lead to irregular functioning of the gills due to obstruction by silt particles.

7.18. Reduction of the Fishing Stock and Resulting Conflicts

The sites used for fishing may suffer interference caused by dredging in relation to fish and are related to the resuspension of sediments that can cause the temporary scaring of some species and consequent reduction of the fish stock, affecting the communities that depend on this resource.

In addition, there may be interference related to the possible intervention in vessel traffic during the dredging operations.

8. Proposal of Environmental Programs

In view of the diagnosis made in the area, the typology of the project and the survey of the main impacts that may arise from the implementation and operation of the Terminal, the environmental programs contained the table below were proposed.



Environmental Programs	Impacts		Phases	
Environmental Programs	impacts	I	0	D
Environmental Management and Control Program (PCAO):	Contamination and waterproofing of soil; Erosion in marginal areas; Loss of plant cover; Disruption and frightening of terrestrial fauna	x	х	x
Subprogram of Guidelines for Construction Sites	Soil Contamination and Waterproofing	Х		
Solid Waste Management Subprogram	Solid waste management	х	х	
Subprogram of Control and Monitoring of Liquid Effluents	Liquid effluent generation			
Air Emission Control Subprogram	Air Pollution	Х	Х	
Noise Control and Monitoring Subprogram	Sound Pollution	х	х	
 Subprogram of Environmental Education and Social Communication - PEACS 	Generation of employment and income; Change and disruption in the daily life of the population; Incompatible practices of workers involved in the installation and operation	x	x	x
Water and Sediment Quality Monitoring Program	Alteration of Water Quality and Generation of Suspended Sediment			х
Sediment Plume Monitoring Program	Formation of sediment plumes; Generation of suspended sediments			х
Monitoring Program of the Benthic, Ichthyofauna, Phytoplankton and Zooplankton Community	Interference in aquatic biota in pelagic, demersal and benthic organisms			х
Program for Monitoring and Modeling of Hydrodynamic and Oceanographic Parameters	Water bodies sedimentation; Alternation in local hydrodynamics; Erosion in marginal areas			х
Monitoring program for bioindicator species	Interference in aquatic biota in pelagic, demersal and benthic organisms; Changing water quality			х
Environmental Monitoring Program for the Area of Disposal of Dredged Material	Changing water quality; Interference in aquatic biota in pelagic, demersal and benthic organisms			x
Program of Support to Fishing Communities	Reduction of the fishing stock and conflicts caused by the alteration of the fish stock			х
Synanthropic Wildlife Control Program	Proliferation of Harmful Synanthropic Fauna		х	
Risk Management Program/Emergency Action Plan (PGR/PAE)	Hazardous Product Accident Risk		х	
Individual Emergency Plan (PEI)	Hazardous Product Accident Risk		Х	
Mutual Assistance Plan (PAM)	Hazardous Product Accident Risk		х	
Note:				
I – Implementation Phase				1
O – Phase of Operation				1
D – Dredging				

Figure 7. Main environmental programs and impacts related to the stages of implementation (I), dredging (D) and operation (O) of

the SUA05

Source: Own elaboration, from the applicable environmental legislation

8.1. Environmental Management and Control Program of Works

The Environmental Management and Control Program of Works – PGCAO covers a set of recommended basic guidelines and techniques, to be used in advance and during the dredging and operation, to monitor



and control the environmental conditions within the project area, thus allowing for the anticipation of corrective and preventive actions, minimizing the potential environmental impacts related to the activities.

In general, the main objectives of this program are:

- Ensuring that the planned interventions take place according to the current legislation in order to avoid or reduce possible negative environmental impacts, through the implementation of the proposed preventive, control and mitigation measures;
- Implementing environmentally sound operation practices;
- Implementing monitoring actions necessary to evaluate the effectiveness of the environmental control actions adopted;
- Performing actions aimed at workers' health and safety;
- Monitoring the suppression of existing secondary vegetation in the area and removing the remaining fauna, should it occur;
- Monitoring and supervising other environmental programs; and
- Ensuring full compliance with the legislation, regulations, and the requirements and recommendations of the environmental agencies.

For the ordering of the proposed actions, these are divided into the specific Subprograms presented below.

8.1.1. Subprogram of Guidelines for Construction Sites

This subprogram will be necessary for the implementation phase of the project. The main objectives are:

- Implementing and adapting the construction site;
- Adequate and sustainable use of the beds;
- Training of workers;
- Definition of access to work fronts; and
- Demobilization of construction sites, if necessary.

8.1.2. Solid Waste Management Subprogram

This subprogram is recommended for the deployment and operation phases of the enterprise.

Solid waste management aims to establish a set of activities that allow the correct process of collection, packaging, transportation and final disposal of waste generated.

The waste inventory is intended to identify waste generated in the area and intended for temporary storage. The waste generated must, when applicable, have a certification document entitled Waste Manifesto and the respective Certificates of Final Disposal of Waste, regarding the treatment and final destination of solid waste.

In carrying out this program, the following activities shall be carried out:



- Classification and segregation of wastes generated, according to applicable standards and resolutions;
- Proper packaging and storage;
- Collection and transportation, in accordance with existing technical standards;
- Obtain the certificates of destination of wastes, industrial and emission of manifestos of transport of industrial waste, when applicable;
- Appropriate disposal; and
- Specific procedures for the generation, segregation, packaging and final transport of Terminal waste.

8.1.3. Subprogram of Control and Monitoring of Liquid Effluents

This subprogram is necessary for the phases of implementation and operation of the Terminal and has as its main purpose the adequate disposal of the liquid effluents produced by the enterprise.

The main actions provided for in this program are as follows:

- Verification of correct handling of cement and concrete;
- Prevention of leaks of oils and greases;
- Drag control of materials for drainage and water bodies;
- Effluent Monitoring:
 - Definition of monitoring points;
 - Definition of collection methodology;
 - Sample treatment;
 - Methodology of effluent analysis; and
 - Quality control.

8.1.4. Air Emission Control Subprogram

Atmospheric emissions monitoring should be provided in order to allow continuous evaluation of the implementation and operation of the Terminal.

With regard to fugitive emissions, we suggest to prepare a Simplified Emissions Report containing the pollutants monitored. Regarding the pollution from the operation of machines and equipment, we suggest that the emission monitoring be carried out by the measurement of smoke using the Ringelmann Reduced Scale (ERR).

Here are the main actions:

- Humidification of unpaved traffic ways and piles of materials during the construction phase;
- Definition of vehicle speed limits in traffic lanes;
- Permission to travel only to authorized vehicles in the areas involved;
- Maintenance of equipment equipped with diesel engines; and
- Inspection of black smoke in various machines, vehicles and engines.



8.1.5. Noise Control and Monitoring Subprogram

It is necessary to estimate the sound pressure levels on the workers involved in the activities and in the communities close to the work. In order to do so, the noises of the enterprise must be characterized in the day and night periods, referring to the internal and external areas, in a systematized way to allow continuous evaluation of the implementation and operation of the Terminal.

If the noise level measurement values are above the tolerance limits established in CONAMA Resolution 01/09 and ABNT NBR 10.151/2000, provision should be made for the planning and implementation of control measures that reduce emissions of sound pollution, as well as the implementation of monitoring of the efficiency of the measures adopted.

Here are the main actions:

- Implementation of control measures, such as checking the correct maintenance of equipment;
- Restriction of work schedules, avoiding night work, so as not to cause annoyance to the surrounding population (if applicable);
- Monitoring of noise levels:
 - Definition of noise monitoring points;
 - Noise measurements based on NBR 10.151, contained in CONAMA Resolution 01/90; and
 - Analysis of results obtained at all points.

8.1.6. Subprogram of Environmental Education and Social Communication

This subprogram is necessary for the Terminal deployment, dredging and operation phases.

8.1.6.1 Social Communication

For Social Communication it is necessary to establish the forms and the means of communication to inform workers, the different segments of the population and other institutions about the main proposals and programs to be adopted and the mitigating and compensatory measures of the environmental impacts resulting from the implementation of the enterprise.

is way, the implementation of a Social Communication program will allow a rapprochement between the various stakeholders and the entrepreneur, disseminating information about the progress of the implementation and operations of the Terminal.

At the same time, this program allows the suggestion of criticism, expectations and demands of the population. The systematization of proposals and the possibility of evaluation tools must permeate the entire communication process.

Among the main activities, the following stand out:



- Elaboration and distribution of informative material directed to meet the demands related to the implementation, including dredging and operation;
- Dissemination and orientation of the opening of new jobs;
- Elaboration and dissemination of an agenda for the communication of dredging periods and their consequences;
- Creation of an Ombudsman's Office, with a free telephone line and a public e-mail, for community service by technicians able to provide information about the Terminal and its activities and receive suggestions, doubts and criticisms, as well as establishing contact between port managers and the community;
- Regular meetings with municipal, state and federal authorities related to port activities and environmental inspection to present and discuss the progress of the Environmental Programs;
- Appoint and train spokespersons that have a good knowledge of the Environmental Programs developed by the Terminal in order to prepare them to deal with the press and the community.

8.1.6.2 Environmental Education

The main objectives of the Environmental Education program should be:

- Mobilizing and guiding the workers and inspectors involved in the implementation, dredging and operation of the Terminal on environmental protection measures, as well as on adequate conduits of relationship with the community;
- Present the measures to be adopted to minimize the interferences of the enterprise with the environment;
- Improvement and professional training of workers who are involved in the work, training in relation to the adoption of occupational safety procedures, including mandatory use of PPE, and environmental awareness regarding the minimization of impacts related to the work and environmental preservation actions, the promotion of work quality improvement, the reduction of its costs and the compatibility with legal requirements related to the environment, health and safety of the workers.

8.2. Water and Sediment Quality Monitoring Program

The objective of this program is to ensure that the activities carried out during the dredging phases of the enterprise do not result in the degradation of the quality of the surface water resources, which may have its quality changed due to:

- Carrying of solids from soil handling and/or inadequate disposal of solid waste;
- Possible leaks of oil and grease from machinery, equipment and vehicles during construction and operation of the enterprise.

This program has as main activities:



- Monitoring the water quality around the operating area during dredging with a control station to compare material concentrations;
- Providing analysis for the parameters Aromatic Polycyclic Carbons APH throughout the dredging work, and with evaluation of values within the limits established in CONAMA Resolution No. 357/2005;
- Monitoring parameters, dissolve oxygen; turbidity; pH; temperature; conductivity; salinity; water transparency; heavy meals and arsenic; Arsenic (As), Boron (B), Lead (Pb), Cadmium (Cd), Zinc (Zn), Mercury (Hg) and Nickel (Ni), and Aromatic Polycyclic Hydrocarbons APH. b) Quality of sediments: Granulometry Sedimentology; Arsenic (As); Mercury (Hg); Nickel (Ni); Zinc (Zn); Cadmium (Cd); Lead (Pb); Copper (Cu); Total Phosphorus; Total Organic Carbon COT; Total Nitrogen;
- Performing bathymetry and current measurement;
- Collecting water samples to determine suspended solids.

8.3. Sediment Plume Monitoring Program

In general, this program, which is specific to the dredging phase, has as main activities:

- Monitoring of Turbidity Concentrations Turbidity Plume for the measurement of turbidity concentrations;
- Other parameters: pH, salinity, water temperature, conductivity, dissolved oxygen, total dissolved solids, oxidation potential and depth. In pre-dredging, during dredging and post-dredging.

8.4. Monitoring Program of the Benthic, Ichthyofauna, Phytoplankton and Zooplankton Community

This program shall be carried out during the dredging phase of the enterprise, with the following objectives:

- Monitoring of phytoplankton and zooplankton communities;
- Monitoring of the benthic macrofauna with an unconsolidated background; and
- Monitoring of the fish fauna.

8.5. Program for Monitoring and Modeling of Hydrodynamic and Oceanographic Parameters

The objective of the program is to verify, after dredging, the changes in hydrodynamics and sediment transport dynamics, according to the conditions to be measured and mathematically modelled. The activities include oceanographic and hydrodynamic data collection, as well as the modeling itself.

The activities will begin after the completion of the works, since the hydrodynamic model to be employed should have real input data to the scenario where the site will be located, that is, from data measured in the field after the activity, as is contour conditions, bathymetry, current velocity, among others, so that the modeling reproduces the environment as accurately as possible. A hydrodynamic modeling should be implemented to evaluate the current flow pattern.



8.6. Monitoring program for Bioindicator Species

This program is inherent in the dredging phase of the enterprise.

The objective of this program is to monitor the quality of organisms of interest for human consumption in dredging areas, by monitoring metals and organic compounds in their tissues. Through this program data of public interested are generated as the quality of fish, since there is no monitoring with this purpose in the region.

The main activity of this program is:

• Monitoring of commercial species with evaluation of the bioaccumulation of contaminants.

8.7. Environmental Monitoring Program for the Area of Disposal of Dredged Material

This program is recommended for the dredging phase of the enterprise and its main objectives are:

- Monitoring the sediment discharge in the disposal area; inspecting the entire dredging work, the positioning of the vessel in the dredging area and the sediment dumping site;
- Recording the location during dredging and the disposal site, plotting its location, date and time of the activity;
- Dredged Volume Monitoring; volumes dredged through the execution of hydrographic surveys (bathymetry) in the dredging area and sediment disposal area.

8.8. Program of Support to Fishing Communities

This program is inherent to the dredging phase and has as main objectives:

- Promoting a process of awareness of the various actors involved in the issue;
- Defining measures to be adopted to minimize the interference of dredging with fishing;
- Producing educational material with the purpose of sensitizing the population of the region on the socio-environmental issues related to the problem on the screen.

8.9. Control of Harmful Synanthropic Fauna

The Harmful Synanthropic Fauna Control Program is inherent to the operation phase of the enterprise and aims to keep facilities free of any potentially disease-carrying animals and/or representing public health risks, such as insects, arachnids, birds (domestic pigeons and sparrows) and mammals (bats and rats).

This should contain the technical and operational control guidelines including environmental management, presenting a description of the products used with active principles, initial concentration and dilutions of use.



8.10. Risk Management Program/Emergency Action Plan (PGR/PAE)

Hazardous products must be stored and maintained in such a way that there is no interaction with other incompatible products, cargoes or materials, and the risk of the presence or occurrence of heat sources, sparks, open flames or steam pipes is controlled. The Terminal shall prescribe the conditions for the storage of dangerous products in their respective facilities, including the type, maximum quantity and form of storage of such products; dangerous products may only be stored in port facilities under adequate conditions and receiving preventive care of the risks inherent in this operation, applying, when necessary, the procedures prescribed in this Program of Risk Management/Emergency Plan, Mutual Aid of Port and others, complementary by the lessee of the port facility.

The Risk Management Program (PGR) includes in its scope operational procedures, preventive maintenance procedures, employee training procedures and Emergency Response Plan prepared specifically for possible accidental scenarios in the operation phase.

The PGR's basic principle is compliance with current legislation and regulations, always seeking to:

- Minimize operating risks;
- Ensure the safety of its employees;
- Develop adequate processes and materials to preserve the environment;
- Value and preserve the asses of the company/Terminal; and
- Improve the use of available resources, focusing on safety, quality and productivity.

The Program should contain at least the following activities:

- Safety information;
- Risk analysis;
- Change management;
- Maintenance procedures;
- Operational procedures;
- Training program;
- Incident investigation procedures;
- Internal audits of the production system; and
- Emergency Response Plan (PAE). The activities provided for in the Risk Management Program (PGR) should be available to all employees who have responsibilities related to the activities and operations performed at the Terminal.

The Emergency Action Plan (PAE) is an integral part of the Risk Management Program. The purpose of the PAE is to provide a set of guidelines, data and information that provide the necessary conditions for the adoption of logical, technical and administrative procedures structured to be triggered quickly in emergency situations that have the potential to cause external repercussions to the limits of the enterprise and to minimize impacts to the population and the environment.



The procedures included in the PAE are based on the characteristics of the facilities and the operational and safety procedures adopted in the activities related to the reception ,storage and handling of containers.

In addition to the definition of emergency procedures, the Plan has a specific structure in order to:

- Define the responsibilities of those involved in responding to emergency situations, through a specific organizational structure to deal with accidents;
- Promote the integration of emergency response actions with other institutions, thus enabling the launching of integrated and coordinated activities, so that the expected results can be achieved;
- Provide the human and material resources compatible with the possible accidents to be taken care of, in addition to the activation procedures and routines to combat emergencies, according to the typology of the accidental scenarios studied.

8.11. Individual Emergency Plan (PEI)

The enterprise in its operation phase should have an Individual Emergency Plan (PEI) for incidents of oil contamination in waters under national jurisdiction, as determined in Federal Law 9,966/2000 and CONAMA Resolution 398/2008.

The PEI should ensure, at the time of its approval, the facility's ability to immediately carry out the response actions planned to attend to oil contamination incidents in its various types, using its own human and material resources, which may be supplemented by additional resources from third parties, through previously signed agreements.

8.12. Mutual Action Plan (PAM)

The MAP is inherent to the terminal's operation phase and aims to ensure and enable effective compliance with relevant regulations, technical improvement, information exchange and integrated knowledge of the potential risks of each company and collective, defining fast, efficient actions and coordinates.

It is a civil organization, with the involvement of private, non-profit initiative, which acts without a specific term, being prohibited the provision of services to third parties, as well as the exercise of any activity not linked to the fulfillment of its objectives of protection of human life, the preservation of heritage and the environment.

For the participation of companies in the PAM, it is indispensable that they have their respective Emergency Control Plans – PCE, in accordance with the provisions of NR29 and Law No. 9,966/00.

The PAM acts in complementation, and with permanent cooperation of the Fire Department, establishing agreements with other public or private institutions, providing mutual assistance and conditions of infrastructure, techniques and service that allows synergy among all. It promotes the development of the necessary studies for the technical and operational improvement of the actions of control of the identified emergency scenarios, defining strategically, rationally and economically, the availability of the material resources applicable to each case.



9. Pricing of Environmental Costs for Terminal Licensing

9.1. Estimation of Environmental Costs

The calculation of the socio-environmental costs associated with the implementation and operation of the Terminal was based on the following assumptions:

- The costs of permanent activities, such as monitoring and environmental controls, were calculated for the entire period of the lease.
- All costs related to environmental studies and programs are referenced in the DNIT consulting hiring table, as of February/2018 base date. When necessary, prices of equipment and laboratorial analyzes were also estimated corresponding to the prices practiced in the market.
- Costs related to "environmental licensing" include costs related to the preparation of environmental studies compatible with the scale of the enterprise, analysis and licensing fees covering the obtaining of installation, operating and renewal licenses throughout the lease.
- The required licenses and respective environmental studies are those indicated in the chapter of the licensing strategy.
- With regard to environmental mitigation, the preliminary environmental diagnosis, the assessment of the environmental impacts and the environmental programs required for projects with these characteristics were taken as reference. From this diagnosis, the programs applicable to the Terminal were defined.
- For the dredging works, the methodology of environmental cost evaluation of the Port Costs Systems SICPORT of ANTAQ was used.

9.2. Licensing and Analysis Fees

The licensing and analysis fees of environmental studies were calculated based on the values established by the State Agency of Environment of the State of Pernambuco – CPRH, as presented below.



Ministério dos Transportes, Portos e Aviação Civil

Section F - Environment

Enquadramento do Empreendimento							
CPF/CNPJ*:	CPF CNPJ						
Razão Social*:							
Município*:					•		
Isenta de Licenciamento?	◯ Sim ● Não						
Microempresa?	◯ Sim ● Não						
Tipo de Licença*:	PLI - PRORROG	GAÇÃO DA I	ICENÇA	DE INSTALA	ÇÃO	*	
Tipologia*:	10 - OBRAS DIV	/ERSAS			•		
Subtipologia*:	10.1 - ATRACADOUROS, MARINAS E PIERS						
Divisão de Subtipologia*:	10.1.1 - ATRACA	ADORES, M	ARINAS I	E PIERS		•	
Subtipologia Grupo*:	10.1.1.1 - ATRA	CADORES,	MARINAS	E PIERS		•	
Subtipologia Classe*:	10.1.1.1.1 - ATR	ACADORES	, MARIN	AS E PIERES		•	
Porte:	acima de 100 ba	arcos				Ŧ	
Potencial Degradador:	acima de 100 ba	arcos				Ŧ	
Classe da Taxa:	N						
		Dados para o b	oleto				
Valor:	R\$ 5.441,71						
Vencimento:	06/06/2018	dd/mm/aaaa					
				REFAZER	Ì	ENVIAR	

Figure 8. Costs of renewal of the installation license of berths of Terminal **SUA05**

Source: http://www.cprh.pe.gov.br/asp_aplicacoes%5Cboleto.asp

License Fee: Environmental License or Renewal

Small-sized company			
Environmental Impact	Small	Medium	High
Preliminary License	5,426.84	10,853.69	21,707.37
Installation License	15,195.16	30,390.32	60,780.64
Operation License	7,597.58	15,195.16	30,390.32
Medium-sized company			
Environmental Impact	Small	Medium	High
Preliminary License	7,597.58	15,195.16	30,390.32
Installation License	21,164.69	42,329.38	84,658.75
Operation License	9,768.32	21,164.69	42,329.38
Large-sized company			
Environmental Impact	Small	Medium	High
Preliminary License	10,853.69	21,707.37	43,414.75
Installation License	30,390.32	60,780.64	121,561.29
Operation License	15,195.16	30,390.32	60,780.64

Figure 9. Costs of issuance of environmental permits for works in the back area of Terminal **SUA05** Source: Interministerial Ordinance No. 812/2015

For the back area of the Terminal an Installation License for the execution of works should be requested to IBAMA.

As for mooring berths (piers 6 and 7), a renewal of the Installation License 01.15.05.002231-2 will be requested with a deadline up to 11/05/2019 and will be valid for 4 years.

It was considered that renewals of the Operation Licenses will be issued by IBAMA with a validity of 5 years, and should be renewed with this frequency, throughout the entire lease period.

Upon completion of the back area and mooring berth works, a single Operation License will be requested for both areas, as they will be under the responsibility of the same tenant.

IBAMA's analysis fees for the issuance of the Installation License, Operation License and its renewals must also be considered.



Analysis Fee Calculation - IBAMA

Value = { $K + [(A x B x C) + (D x A x E)] }$

A – Number of technicians involved in the analysis.

B – Number of man hours required for analysis.

C – Amount in Real of the man/hour of technicians involved in the analysis + total of social obligations (OS) = 84.71% on the amount of the man/hour.

D – Travel expenses.

E – Number of travels required.

K – Administrative expenses = 5% of the sum of (A x B x C) + (D x A x E).

Source: http://www.ibama.gov.br/procedimentos/tabelas-e-formula-de-calculo-

		LP	LI	LO/renewal
Number of technicians		4	3	3
Number of man hours		100	100	100
Total hour		400	300	300
Value of man hours for technicians	R\$ 56.74	R\$ 56.74	R\$ 56.74	R\$ 56.74
Value of man hours with social obligations	84.71%	R\$ 104.81	R\$ 104.81	R\$ 104.81
Subtotal manpower		R\$ 41,922.03	R\$ 31,441.53	R\$ 31,441.53
Travel expenses				
Air ticket	R\$ 1,570.00	R\$ 6,280.00	R\$ 4,710.00	R\$ 3,140.00
Lodging	R\$ 250.00	R\$ 4,000.00	R\$ 3,000.00	R\$ 1,500.00
Daily fees	R\$ 120.00	R\$ 600.00	R\$ 600.00	R\$ 480.00
Number of days		4	4	3
No. of travels/people		4	3	2
Subtotal travels		R\$ 10,880.00	R\$ 8,310.00	R\$ 5,120.00
Administrative fees	5%	R\$ 2,640.10	R\$ 1,987.58	R\$ 1,828.08
Total		R\$ 55,442.14	R\$ 41,739.10	R\$ 38,389.60
Total		R\$ 55,400.00	R\$ 41,700.00	R\$ 38,400.00

Figure 10. Calculation of costs to obtain environmental licenses Source: Interministerial Ordinance MF/MMA 812/2015

9.3. Environmental Studies

Before the requirements regarding the procedures and scope of the environmental studies to subsidize the emissions of the licenses, the necessary professionals were provided for in the elaboration of a study to define measures of environmental control for port enterprises.

It should be noted that the values were referenced by the DNIT price list used to hire professionals, who considered the social charges, administrative expenses, tax costs and the profit of the company contracted to perform the service.





Sect	ion F - Environmei	nt		
COSTS FOR THE ELAB	ORATION OF ENVIRONI	MENTAL STUDIE	S	
Labor (1)	R\$/month	R\$/h	Hours	Cost (R\$)
P0 – General coordination	31,033.18	176.32	40	7,053.00
P2 – Environmental management	19,130.17	108.69	40	4,347.77
P2 – Atmospheric emissions	19,130.17	108.69	20	2,173.88
P2 – Pest control	19,130.17	108.69	20	2,173.88
P2 – Management of solid waste and effluents	19,130.17	108.69	20	2,173.88
P2 – Noise and vibration monitoring	19,130.17	108.69	20	2,173.88
P2 – Designer/Reviewer/Editor	19,130.17	108.69	40	4,347.77
Subtotal labor				24,444.06
Materials and Services (2)	Unit		Quantity	Cost (R\$)
Transport + daily fees	Sum		1	2,444.41
Administrative + operational expenses	Sum		1	7,333.22
Subtotal materials and services				9,777.62
Profit and Taxes (3)	Aliquot			Cost (RŚ)
Profit	12.00%			4.106.60
Taxes	16.62%			6,370.16
Subtotal profit and taxes				10,530.76
GRAND TOTAL (1 + 2 + 3)				44.698.44

Figure 11. Estimation of costs with preparation of a study to define environmental control measures Source: Own elaboration, from the DNIT Consulting Table

9.4. Environmental Programs

With regard to environmental impact mitigation, the preliminary environmental diagnosis, the assessment of the environmental impacts and the environmental programs required for projects with these characteristics were taken as reference.

The environmental management structure, both for the implementation and for the operation, will be the responsibility of the tenant of the Terminal, which will have its own staff comprised of a full professional and a full technician, specialists in the area of environmental management and work safety. This structure will also develop actions focused on Social Communication and Environmental Education that will manage the relationship of the Terminal with the community and the awareness of employees with sustainability issues. In this case, it was considered the monthly salary of these professionals, based on the DNIT hiring table (base date February 2018) plus social charges (84%).

The subprogams contained in the Program for Environmental Control and Management of Works – PGCAO, during the installation phase of the Terminal, were foreseen to be executed by hiring outsourced services. All other environmental programs and actions, in the operation phase, will be outsourced, with the hiring of specialized consulting services, which will be subordinated to the environmental management structure of the Terminal lessee.



In this case, the DNIT table for hiring professionals was also used as reference, however, plus the following costs and expenses: social charges (84.04% on salary); administrative (30% on salary); tax (16.62% on salary + administrative charges + company compensation); and remuneration of the outsourced company (12% on salary + charges + administrative).

Where relevant, the costs of acquiring equipment, laboratory tests, daily allowances, air tickets and other expenses necessary for the execution of the environmental programs were included. For the Risk Management Plan, the drafting service was considered, which should be done every 3 years, and the annual training for the safety procedures of Terminal employees was added.

The following table presents cost estimates for the environmental programs envisaged for the **SUA05** lease area.

ENVIRONMENTAL PROGAMS FOR THE TERMINAL						
Phase of Operation	R\$	Frequency				
Environmental Management Program (PGA)	306,363.00	Annual				
Environmental Control Program	424,661.20	Annual				
Atmospheric emissions	24,035.38	Annual				
Pest control	305,800.00	Annual				
Management of solid waste and effluents	24,912.91	Annual				
Noise and vibration monitoring	24,912.91	Annual				
Risk Management Program / Emergency Action Plan (PGR / PAE) / Individual Emergency Plan (PEI)	6,733.61	Annual				
Audit CONAMA No. 306/02	26,705.98	2 years				
Audit ISO 14001	26,705.98	3 years				

Figure 12. Costs with environmental programs in the phase of operation

Source: Own elaboration, from the DNIT Consulting Table

Some environmental programs had part of their costs parametrized from the Port Lease Program, using information of a technical, methodological and operational nature that subsidized the definition of the effort needed to execute certain environmental programs. These amounts, when used, were updated using the IPC-A for the base date of February 2018.

9.5. Pricing of Environmental Costs for Dredging Licensing

The environmental cost for dredging shall be borne by the lessee.

The following are the costs associated with the complete licensing of dredging works.



Enquadramento do Empreendimento						
CPF/CNPJ*:	CPF CNPJ					
Razão Social*:						
Município*:				•		
Isenta de Licenciamento?	⊖ Sim ● Não					
Microempresa?	⊖ Sim ● Não					
Tipo de Licença*:	AUT - AUTORIZ	AUT - AUTORIZAÇÃO 🔹				
Tipologia*:	13 - INFRA-ESTRUTURA					
Subtipologia*:	13.04 - PORTOS T					
Divisão de Subtipologia*:	13.4.1 - PORTOS •					
Subtipologia Grupo*:	13.4.1.1 - PORTOS 🔹					
Subtipologia Classe*:	13.4.1.1.1 - POF	RTOS		•		
Porte:	acima de 2 a 10	hectares		•		
Potencial Degradador:	acima de 2 a 10	hectares		•		
Classe da Taxa:	N					
	ſ	Dados para o boleto				
Valor:	R\$ 7.255,59					
Vencimento:	11/06/2018	dd/mm/aaaa	-			
			REFAZER		ENVIAR	

Figure 13. Authorization costs for dredging works from pier 6 and 7 – Terminal SUA05 Source: http://www.cprh.pe.gov.br/asp_aplicacoes%5Cboleto.asp

There is an Authorization for dredging works issued on 21/09/2017 with a term of 1 year. The renewal of the authorization is expected in 2019. As per the table above, the renewal amount will be R\$ 7,255.59.

• PBA – Dredging

For the definition of the costs related to the implementation of the PBA for the works and maintenance of deepening dredging that should occur in **SUA05** Container Terminal, an average index was adopted that was applied over the total value of the investments.

This index measures the amount that should be spent annually to execute the environmental programs of the works (deepening) and maintenance of dredging.

The SICPORT system of ANTAQ was used as an environmental cost parameter, which defines an average index of environmental expenditures on the value of the project, in this case, the total value of the dredging works (deepening and maintenance).

According to the SICPORT system, the minimum environmental spending index for the PBA is 0.10%. This parameter is applicable for the deployment phase.

Also according to the SICPORT system, the average rate of environmental expenditures to execute the PBA is 0.80% and includes the implementation of dredging monitoring programs. For the implementation phase, this parameter is applicable to CAPEX from deepening dredging and for the operation phase, the index will be used on the maintenance dredge value.

Thus, the aforementioned indices were applied to the total value of dredging works, called VTE for modeling purposes, reaching the environmental cost of the PBA for each phase, as shown in the following table:



Section F - Environment						
CAPEX	QUANT.	UNIT	TOTAL OF THE WORK	REMARK		
Deepening Dredging	1	231,284,966.05	231,284,966.05	1 Year		
TOTAL ENTERPRISE VALUE - VTE		231,284,966.05	Project			
PBA Environmental Cost – Drafting (0.1% of VTE)		R\$ 231,284.96	1 Year			
PBA Environmental Cost - Implementation (0.8% of VTE)		R\$ 1,850,279.47	Annual			

Figure 14. Environmental Costs for PBA Dredging Source: Own elaboration

Assuming that maintenance dredging will be the responsibility of the Port of Suape administration, the costs of environmental dredging programs during the operation of the Terminal were not considered. Therefore, the cost of the PBA of the dredging will be assumed by the lessee only during the execution of the deepening dredging works, which should last for 1 year.

Annex F-1 shows the breakdown of the amounts considered in the project cash flow, subdivided into environmental licensing costs, environmental programs, as well as costs for environmental management.



Ministério dos Transportes, Portos e Aviação Civil



Seção F – Ambiental

Annex F-1

					-											-										
SUA05		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
TERMINAL (C	AIS E RETROÁRE	A)																								
Implantação	Estudos	369.917	324.917	324.917																						
	Licenças	414.389																								
Operação	Licenças			59.565					59.565					59.565					59.565					59.565		
	Programas				737.757,81	764.463,79	764.463,79	764.463,79	737.757,81	791.169,78	737.757,81	764.463,79	764.463,79	764.463,79	737.757,81	791.169,78	737.757,81	764.463,79	764.463,79	764.463,79	737.757,81	791.169,78	737.757,81	764.463,79	764.463,79	764.463,79
DRAGAGEM																										
Autorização		7.256																								
PBA		2.081.565																								
TOTAL		2.873.126	324.917	384.482	737.758	764.464	764.464	764.464	797.323	791.170	737.758	764.464	764.464	824.028	737.758	791.170	737.758	764.464	824.028	764.464	737.758	791.170	737.758	824.028	764.464	764.464
Legenda:																										
Programas Operação						I																				
Programas Ope	ração+CONAMA 30	06/02				Ī																				
Programas Ope	ração+ISO 14001					I																				
Programas Ope	ração+CONAMA 30	06/02+ISO 14001				İ																				
Nota:																										
1. É previsto prazo de 3 anos para implantação/adequação do terminal.																										