Republic of Panama

Environmental Impact Study, Category II: "Project for the construction of a pier in the Telfers Sector, District of Cristobal, district and province of Colon"

Presented to:
National Environmental Authority (ANAM)

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2.0 EXECUTIVE SUMMARY

2.1 General Data Of The Company

The project sponsor is LNG GROUP PANAMA S.A., whose legal representative is JOSE DAPELO BENITES, with passport No. C488000. The company is written in the Public Registry of Panama in 674296, 1643967 Document tab.

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2.2 Description of the project; To develop, approximate budget.

The project consists of the construction and operation of a marine terminal of liquefied natural gas (LNG), which will be enabled to receive, download, store, regassify LNG and natural gas transportation to ground, (Annex 2).

Basically, the regasification process consists of:

Transport: The Liquefied Natural Gas (LNG) is transported in a liquid state at -160ºC in special ships (tankers). The LNG carriers are extremely safe, thanks to its extensive security measures and its robust design (double). There has never been an incident in a boat tanker that has resulted in a loss of LNG.

LNG unloading LNG carriers: transfer the LNG to the regasification plant by unloading arms. The arms are the surest way to download fuels. The arms incorporate some safety valves that are practically non-existent potential LNG spills in case of emergency.

Transfer toward the tanks: The bombs of the LNG tankers driving the LNG from the boat to the storage tank through the unloading arms and a cryogenic (line that supports very low temperatures).

Storage: The LNG is stored at - 160 °C in a total containment tank. This tank is actually formed by two tanks, one within the other. The inner tank is cryogenic steel (which supports very low temperatures) and has a thickness of several cm. It is surrounded by insulating material and the outer tank, pre-stressed concrete of 1 meter thick. In the unlikely event that the inner metal tank suffered a leaking tank exterior concrete would retain the LNG and the vapors are stored. On the other hand, the tank's concrete exterior protects it from any cryogenic combustion event of neighboring plants that store fuel storage terminals of liquid fuels).

In summary, the terminal will have the capacity to berth vessels, where it will be stored and will be carried out the process of regasification plants. These vessels will be connected to the terminal and, considering the supply of a ship per month, you will have the ability to boost to ground the liquefied natural gas (LNG), delivering on the ground to a cryogenic storage tank of 175,000 m3, which caters to a regasification plant for producing natural gas that is delivered to a branch or pipeline for distribution to final consumption centers.

Natural gas is regarded as one of the fossil fuels cleaner and more environmentally friendly. Its comparative advantage in environmental matters in relation to the coal or oil lies in the fact that the sulfur dioxide emissions are negligible and that the levels of nitrous oxide and carbon dioxide are much smaller. This property comparative LNG makes a contribution to sustainable development in the region.

The project, in addition to providing an infrastructure that will facilitate the provision of safe and reliable natural gas, economic benefits associated with the investment of capital

for new projects, employment generation, creation of infrastructure, and generation of other income associated with the activity.

It is important to note that there are two spring simulation studies carried out by the Center for Simulation, Maritime Research and Development (SIDMAR) of the Panama Canal Authority, and approved by them with the compatibility study granted (Annexes 4 and 5). For these studies, the main recommendations that emerged were (apart from the vast majority that dealt with maritime safety recommendations):

- The minimum depth under the keel should be 2 meters
- Environmental limits should be established as winds, tides and visibility. This is to ensure a safe margin to enable it to operate under most operating conditions
- The currents in the area must not pass of 1.2 knots
- The location of the spring should be away from populated areas and marine traffic

The above, was taken into consideration when the study was: Analysis of the hydrodynamic characteristics (currents, tides, waves). Site of the Spring Island Telfer, Colon Province, carried out by the specialist who worked in this EsIA (Annex 6). Within the main conclusions of this study, taking into account the recommendations of the two aforementioned simulation studies we have:

- The speeds in the construction site of the spring range from 0.03 to 0.12 m/s and are directed toward the SW 232° in situ measurements.

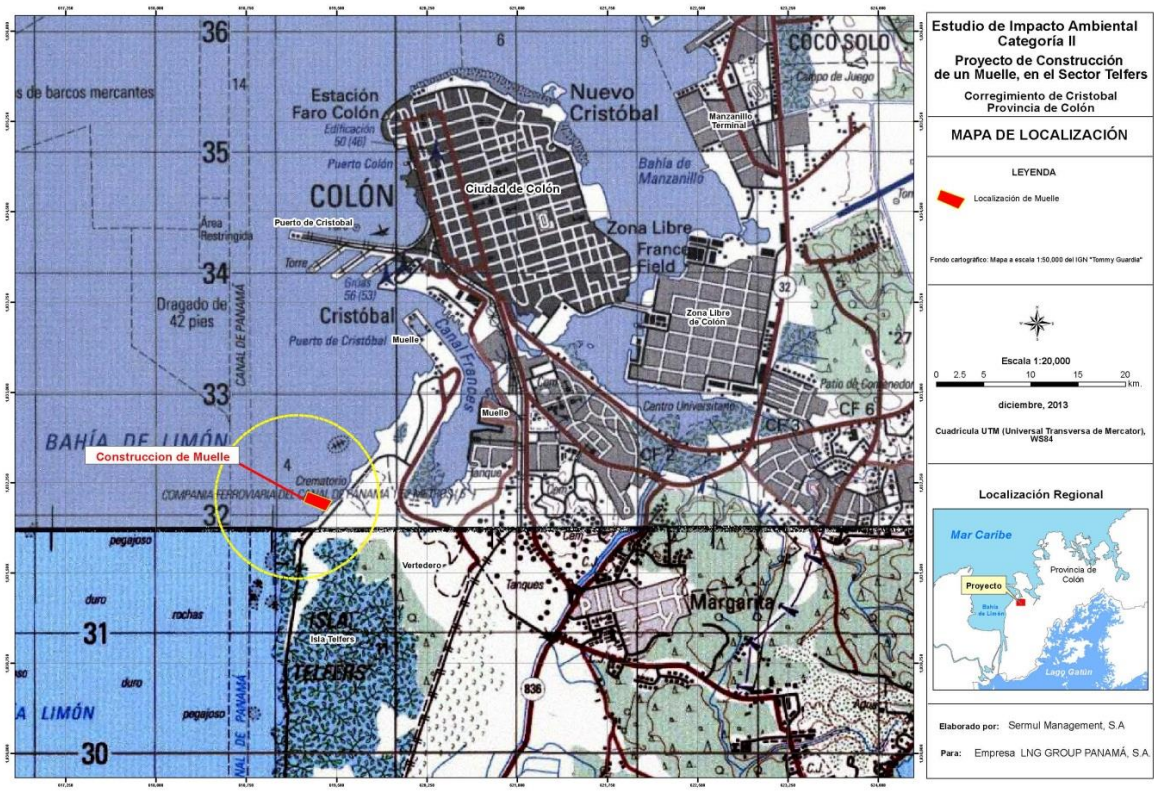
- The results of the model show that this is a body of water of weak speeds to the western end and anchor in the area of Puerto Cristobal like the French Channel. While, in general, the area of construction of the pier presents with moderate slightly speeds, between 0.09-0.12 m/s, with direction toward the SW.

- The maximum and minimum values of significant wave height are presented in the months of February and October respectively.
- The waves in the area proposed for the construction does not exceed 0.5 m high significant and comes from the WNW in its transformation. So that the dimension of coronation of the spring is enough to this condition.
- There are no significant changes in the behavior of the current direction and speed by construction of the pier.
- As you can see in Figure 2.2-1: PROJECT LOCATION, the same is away from populated areas and marine traffic

The project is located with the following coordinates in UTM:

Point 1: 0619319E/1045043N;
Point 2: 0620864E/1045043;
Point 3:0620864E/1046553;
Point 4: 0619319E/1046553N.

Figure 2.2-1 : Location of the Project



In the planning stage, perform a variety of activities, among which we can mention: Collection of existing information, the conduct of preliminary field studies and final designs, studies of current capacity and feasibility of drinking water systems, sanitary service, electrical service and communications, preparation of the Environmental Impact Study and its approval, obtaining all permits with the corresponding authorities.

It is not considered stage of **abandonment** in this project, however, once the construction phase will leave the place totally clear of debris and completely clean.

In the project will be the construction of a pier.

The labor for the project is dimensioned considering all of the components that make up. The **construction phase** will have an average of 120 people per month and a maximum of 170 people per month.

In the **implementation phase** will require the following staff (skilled and unskilled):

- Civil Engineer with specialty in health care,
- Civil Engineer
- Inspectors,
- Administrative Staff (Manager, secretary, etc.),
- Foreman.

In the stage of operation has an average of 40 persons per month and a maximum of 60 people per month.

The area where you will build the Pier, corresponds to an area where there are already established companies with operations similar to the project.

The estimated investment of the work is of B/. 25, 000,000.00 (Twenty-five million with 0/100)

2.3 Summary of the characteristics of the areas of influence of the project.

The stratigraphy of the area of the development of the project, in the top[1], is characterized by non-consolidated sediments, filled with sand and corals. Underlying in addition, formations of lacustrine sediments [2] (sediments Holocenos), made up mainly of silty sand, silt and organic clays.

The soil has a use similar to the project operations such as Atlantic Pacific, S.A. (APSA) in the storage of fuel from the Atlantic Coast and the PETROPORT with the storage of Liquefied Petroleum Gas which are neighbors of the area selected in the Telfers Island.

[1] Geological Map, Republic of Panama, Ministry of Trade and Industry, Mineral Resources, 1991

[2] Geologic Map of the Panama Canal and Vicinity, Republic of Panama, 1980

We also develop activities of the authority of the Panama Canal and Panama Ports Company.

The agrological capacity in the area of the project, corresponds to soils of class V, VI and VII (according to the classification of the Soil Conservation Service of USA). The project area has traditionally been used for activities related to the adjacent port facilities and distribution of liquefied gas.

The climate that is presented in the study area, is determined by the influence of the oceanic masses, mainly in this case, the Caribbean Sea. The high humidity is an example of this, determining the properties of temperature of the air masses circulating between the oceans. According to the Köppen classification system, of the three (3) Climatic zones that exist in the Canal Watershed in the project area is considered to be tropical wet climate (AWI), which is characterized by a higher average annual rainfall of 2.500 mm, a summer of three (3) months and an average annual temperature between 24° C and 26° C.

The meteorological features of the area of influence of the project, described for the elements: temperature, precipitation, and wind. This information is useful for establishing basic conditions for the design, construction and operation of the project must have.

The average annual temperature registered is of 26.88° C (80.4° F), with an absolute minimum temperature that goes up to 18.88° C (66° F) between the months of November and December, and an absolute maximum temperature of 52.5° C (95°F), registered in the months of May and October. However, the minimum and maximum averages for the year are located at 24.55° C (76.2° F) and 29.33°C (84.8° F), respectively, which shows a thermal gradient averaged approximately ± 2.4 °C.

In general, the rainy season is beginning in the month of April and ends in the month of November to December; but is mainly concentrated between the months of October and November.

The currents are linked closely to the movements of the earth and the exposure of the oceans to the solar rays. In turn, the sea-atmosphere interaction determines the properties of heat and humidity of the air masses that circulate through the oceans, affecting heavily the meteorology which is manifested on the earth.

The characteristics of the air quality are modified by the presence of sources of pollutants, of which in the project's area of influence, are distinguished only the corresponding to mobile sources of existing landfill and vehicles that circulate in the area and on the access roads.

During the visit in the project area were perceived characteristic smells of the garbage dump located in the area.

The vegetation present in the project area is low, because the site has been conditioned for the development of the different stages of other projects.

The current use of adjoining sites of the project corresponds to an area where there are already established companies with operations similar to our project as are Atlantic Pacific, S.A. (APSA) in the storage of fuel from the Atlantic Coast and the PETROPORT with the storage of Liquefied Petroleum Gas which are neighbors of the area selected in the Telfers Island.

Currently, in the city of Colon and the surrounding area, including the community of Sabanitas, the management system of the wastewater consists basically in the sanitary sewer of the I.D.A.A.N. In the city of Colón and its surroundings, including the communities of Sabanitas, Cativa, Puerto Pilon, Villa Alondra and Cristobal, the

management system of the wastewater consists basically in the sanitary sewer system and primary treatment in septic tanks and percolation Imhoff and seagrass beds. The predominant productive activity of the community is oriented toward commercial, industrial, transport, storage.

2.4 More relevant information about the critical environmental problems generated by the project

The project is located in the marine area of the Caribbean Sea, the area where the aim is to develop the same, is a designated area for industrial use, where there are other similar industrial activities.

In the construction phase of the project will be established buildings, warehouses, deposits and other, located in a given area or any other sector, roofing or not, the purpose of which is oriented to the administrative and logistical support of the work, are these buildings such as offices, parking lots, warehouses, dining rooms, bathrooms for the staff, garages for the maintenance of vehicles, areas of collection, etc.

For these facilities is estimated using spaces for pre-assembly of piles and for temporary offices and facilities in the project area, which could affect the landscape. Affected the air quality in the construction stage by contamination with dust, produced by the movement of soil and traffic of heavy equipment, and for possible bad smells at the same time for the given movement of the seabed for the installation of the piles; however, at the stage of operation does not adversely impact the quality of surface water or groundwater or aggressive emissions to the environment.

2.5 Short description of positive and negative impacts generated by the project

The potential **positive impacts** are: employment generation, improvement of the quality of life of the population, development and intensification of economic activities, increase in the value of the land uses compatible with the territorial planning.

The following are the possible **negative impacts** that can be generated in the middle by the actions of the project.

Table 2.5-1 : Possible Negative Impacts

Potential Impact	Description
Resuspension of sediments and the reduction of transparency.	The pile driving actions that are the structural basis of the esplanade or spring. Iran grounded to 15 m, other to 10 m. These whether kneeling by hydraulic pressure or by excavation have the capacity to generate resuspension of solids. Heavier sediments quickly settle, but the fine sediments, clays and silts remain in suspension and these are transported by the currents and swells covering large areas and generating turbidity, and increasing the concentration of suspended solids, surpassing the natural condition. The impact that physical decline will occur is the transparency of the water column, which will have a limited duration, especially since that will be basically fractions of sand, silt and clay by the depth, severity and density settle out quickly, in the same place.
Alteration to the Hydrodynamics	This impact occurs when you alter or reduces the tidal prism. The morphological configuration of a system such as the Lemon Bay is the result of the interactions between factors such as the prism of tides, currents, and the prevailing direction of waves.
Affectation to the sedimentary dynamics	If you generate a significant impact to the hydrodynamics, the alteration in the sedimentary dynamics is likely.
Changes in the quality of the sea water.	The constructive activities of the Castled and pile driving can affect the quality of the sea water to provide a greater amount of solids in suspension. These changes can affect both benthic and pelagic organisms in the project area.
Damage to the bodies of the fund	The construction of the new pier leads to the establishment of a castled in the coastal area and installation of piles as part of the constructive activity. The Castled directly affects the bottom organisms because it eliminates the species that may be associated to it and who have limited mobility.
Changes in the benthic habitat.	The sea is affected by the construction of the castled in the coastal zone, although these effects are much lower when installed piles. However, in one or another activity will occur in damages to habitat to a greater or lesser degree.

Potential Impact	Description
Affectation to pelagic organisms.	All marine activity carries some kind of affectation to pelagic organisms, so that you can assess the level of alteration to these agencies. Especially during the construction of the pier, pelagic organisms tend to be more affected than during the operation phase.
Creation of new marine habitats	The construction of the castled, regardless of which affects the seabed, it also creates a new habitat that is usually conquered by invertebrate species associated with rocky coast.
Risk of accidents	Would consist in the possibility of a worker suffering a certain damage resulting from their work activity. Are considered diseases, diseases or injuries with reason or on the occasion of the work.

Source: Prepared by the consultant. 2014

2.6 Description of mitigation measures, monitoring, surveillance and control provided for in respect of each type of environmental impact identified.

The following are recommended mitigation measures:

Measures to control the quality of the sea water

During the construction phase of the Castled and pile driving could occur oil spills, dumping of waste, increased sedimentation or of particles in suspension. Some measures are proposed during the construction phase:

- Train staff on issues related to spills and accidents with substances such as fuel or lubricants.
- Keep the computer you are using, land and sea, in good condition in order to prevent leakage of fuel or lubricants.
- Remove any spilled fuel or oil immediately and arrange suitable sites.
- Do not pour sewage, solid waste or the sea.

- Implement measures of monitoring, surveillance and control such as visual inspections and periodic monitoring of the quality of sea water.

The activities of the spring during the operation stage, can generate impacts on the quality of the sea water, among them we find possible leaks that may have the boats that use, accidental spills during shipping or supply, discharge of waste and organic waste to the sea or discharges of wastewater from vessels or boats. To reduce the occurrence of effects on the quality of the sea water, we propose the following measures:

- Train staff on issues related to the management of spills and accidents with substances such as fuel or lubricants
- Remove any spilled fuel or oil, immediately and arrange suitable sites
- Do not discharge wastewater or solid waste to the sea.
- Perform periodic monitoring of water quality, in the area of the spring

Measures to control sedimentation of the Seabed

The activities during the construction phase, Castled and pile driving can cause an increase in the generation of sediment, which have to be treated properly so that, ultimately, do not affect the seabed.

- Follow the set out proposed in the suggested measures to control the increased sedimentation during the construction phase of the project in the terrestrial zone.

During the operation phase, it is expected that there will be significant changes in the sedimentation of the seabed. The effect of the barges on the sedimentation of the seabed will be timely and temporary.

Measures to reduce their effects on the benthic species

During the construction phase, it is expected an increase in the sedimentation, product of the activity itself, which may affect species of benthos. In order to avoid this effect it is recommended:

- The use of piles for the construction of the structure (as set out in the project description). The stilts have the characteristic that are less invasive in marine environments, so its use for these structures is recommended.

During the operation stage of spring it is not expected that the benthic organisms are affected. However, it is advisable to follow a number of measures aimed at preventing the involvement of the same. It is advisable to take the following measures for the conservation of these agencies:

- Do not discharge wastewater or solid waste to the sea.
- To control the access of boats to shallow areas where the propellers may affect organisms living in the sediment at the bottom.

Measures to reduce the changes in the morphology of the benthos

It is expected, during the construction phase, the modification of the relief fund product mainly of the Castled and pile driving. While the castled has an alteration of the benthos are not mitigable, the placement of piles is one of the less intrusive activities used in the construction of ports, given that the alterations to the fund are very punctual.

- The use of stilts (presented in the description of the project) is in itself an excellent measure to reduce changes in the morphology of the benthos.

In the stage of operation are not expected an alteration of the relief fund except that caused by natural sedimentation processes. Every time that there may be a risk of an

increase in the sedimentation and therefore a change in the morphology of the benthos by unnatural causes, suggests the following:

- The measures presented to control the increase in sedimentation.
- To control the access of boats or boats to the shallower areas.

Measures to reduce the impact on the pelagic organisms

The pelagic organisms are affected by the construction of structures in the sea, so it is expected this same effect during the construction of the pier. This is a negative impact to make the agencies move to quieter areas. The impact of this action is negative, by making the pelagic organisms will move to other areas, more quiet, during the period of construction of the structures. Although these actions are of a temporary nature, it is recommended that:

- Implement the measures for the control of the deterioration of the quality of the marine waters (construction phase).
- Remove any spilled fuel or oil immediately and arrange suitable sites.
- Limit the number of vessels used during the process of construction of the pier.

During the operation phase, it is expected that the pelagic organisms return to the area and that it can be used as a refuge for some of them.

- Is the possibililty preventive maintenance tasks for the machinery that works in the driving of the piles.
- You must exercise extreme caution in the tasks of concreting over the water.
- You will not be able to wash tools or equipment next to the bay, having a specific area for this purpose.
- To implement the norms and conventions (MARPOL 73-78) to reduce marine pollution by oil spills

- Train staff on issues related to spills and accidents with substances such as fuel or lubricants;
- Dispose of absorbent oil and floating barriers to avoid short-term the dispersion of hydrocarbons in the water.
- Comply with what is established in the 35-2000 DGNTI-COPANIT Standard on Water, Liquid Effluent Discharge directly to bodies and bodies of surface water and groundwater, continental and maritime.
- Implement the plan for monitoring the quality of the marine water and sediment.
- Implement measures of monitoring, surveillance and control such as inspections
- Visual and periodic monitoring of the water quality of both at the stage of construction and operation.

Management measures

The contractor must have a specific procedure for:

- Supply of fuel and oil change for the machines that will work in the construction of the piles and the docking platform.
- Procedure for checking the machinery, which includes in addition to the preventive maintenance the initial check of the hydraulic lines.

Implement a money laundering working tools for concreting, along with the site of older equipment washing

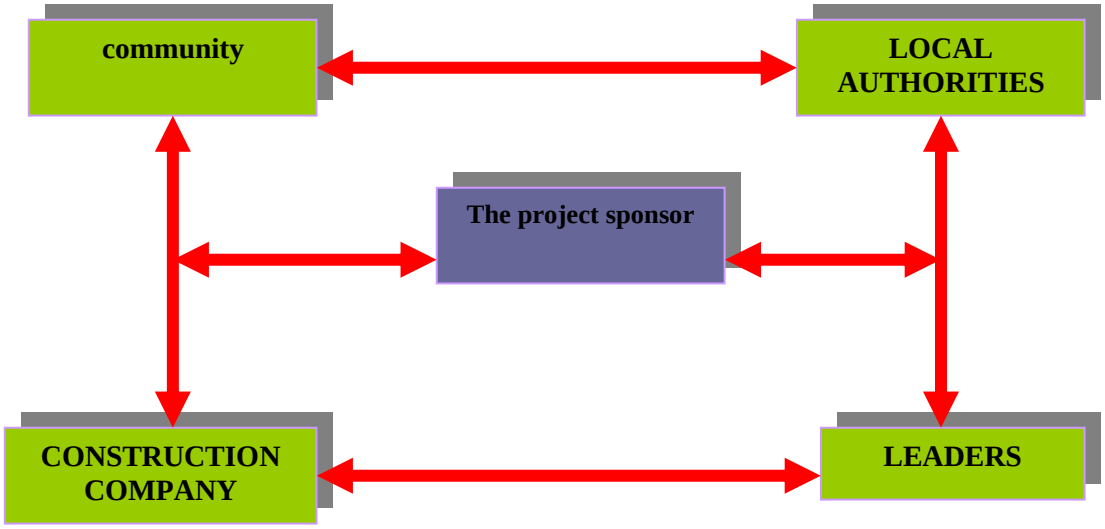
2.7. Description of the citizen participation plan.

Depending on the scope of the Executive Decree 123 of 14 August 2009, in its Chapter II: The Citizen Participation Plan, Article 30, we describe as developed by the consultant team in this area.

A. Identification of key actors within the area of influence of the project, work or activity (communities, authorities, organizations, community boards, environmental advisory councils, other).

The actors involved in the project which is the subject of study, can be clearly observed in the scheme below.

Figure 2 .7-1: Actors involved in the project which is the subject of the study



The relationship that must exist between the different actors involved in the implementation of the project is broadly reflected in the figure. This implies a close relationship between the different actors, which allows an absolute communication and trust between them, which ensures continuity of the project. The fundamental actor of the work, is identified with the community to avoid misunderstanding and mistrust.

B. Participation techniques employed to key stakeholders (surveys, interviews, workshops, assemblies, meetings, etc.), the results obtained and its analysis.

Within the participatory techniques employed, we have the implementation of survey, informal interviews. Everything was led by a document attached in Annex N° 8. The results in our view were satisfactory and can be seen clearly in point 8.3 (local perception on the project, work or activity through the Citizen Participation Plan). An objective analysis of the results of the Plan of participation, the acceptance of the work but, with some apprehensions that are no more than a reflection of lack of information and domain on the subject of the work proposal.

C. Techniques of dissemination of information employees. Given the complexity and dominion of the topic to be discussed, was used as the diffusion technique, the open conversation. This allowed a direct relationship with the main actors of the project. This discussion was allowed in the first place, trust between them and, on the other hand, a comprehensive explanation of the scope of work proposal for its development. In the annex is an informative document of Notice of Public Consultation, which was used as a guide to inform the community about the scope and development of the work proposal.

D. Information request and response to the community. One of the concerns presented by the community is the contamination of the environment, fauna, flora and people. If it is true, was expanded in some way the explanation of the scope of the work, it is recommended that the implementation of alternatives that permit the increase, to the extent possible, the degree of knowledge of the community on the proposed project. This will help to avoid any disagreement about the project, once the implementation of the same. This is the best means of responding to the requests for information and response to the same.

E. Contributions of key actors. For the phase that involved the community in the Citizen Participation Plan, one of the greatest contributions, was offered by the consultant team. The contact between the two sides, cleared my doubts with the daily live and evolve in the area you have chosen to run the project. In the analysis of point b (participatory techniques employed to key stakeholders (surveys, interviews, workshops,

assemblies, meetings, etc.), the results obtained and its analysis), with clarity, the latent concern of the inhabitants of the area of influence of the project and the mechanisms that the consultant team poses to settle the differences indicated by them.

F. Identification and resolution of possible conflicts generated or strengthened by the project. A fundamental aspect that must be considered by the managers of the work, is to maintain a direct and permanent communication with the community, so that if it were ever to be some inconvenience, this can be remedied by means of dialog and understanding between the parties. It is advisable and prudent, provide all possible opportunities to those who express affectation or disagreement around the project, as well as delivering answers that satisfy the nonconformity of the affected.

To occur some incident in this regard, we must not lose sight of the three fundamental characteristics for the resolution of conflicts and which we quote below: Focus the dispute to apply a solution, the negotiations must be based on the interest and can be supported with the existence of a third of impartial type.

It is the responsibility of the Company, strict compliance with the agreements established with the Community, prior to the start of the construction of the work or any that may arise during the process or when it is to start operations. This will help to ensure the strengthening of the relations that should prevail between the Community and the promoter of the project.

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3.0 INTRODUCTION

3.1 Scope, objectives and methodology of the study presented.

The document that was prepared and presented for the evaluation of the ANAM has as **objective to** analyze the impacts that can cause the activities for the construction of a pier and recommend measures for the minimization of the negative effects. Another objective of the document submitted is to obtain the permission of the ANAM. To achieve these objectives has been developed the **scope** of the study presented: a detailed evaluation of the area where the aim is to develop the project, an analysis of the activities of the project and its consequence (impacts that may cause) for the natural environment, development of Environmental Management Plan which will minimize the negative effect that you will be able to have the development of the project for the natural environment. The **methodology** used consists of:

- Development of a work schedule.

- Visits, travel to the area where the aim is to develop the project by the interdisciplinary team, collection of field information related to natural environmental factors: physical, biological and socioeconomic aspects.

- Socio-economic data collection and application of adjacent to the population survey on the acceptance of the project, interviews with persons representing the community and the government sector, in compliance with the regulatory process.

- Collection of statistical data on the population of the area, climate, geology or other bibliographic aspects.

- Interview with professionals who know the construction sector and the energy, and the problems that may arise with the development of the project.

- Consultations on the internet.

- Analysis of the activities of the project in its different stages, the infrastructure build, financial data and other information relevant to this.

- Analysis of the activities of the project versus factors of the natural environment made by each team.

- Discussion of the impacts identified and recommended mitigation measures.

- Development of the document.

- Recommendations or suggestions needed to achieve the goals proposed to the project promoter. At the time of delivery of the final document, is aware of all the commitments made to the developer and responsible for the environmental part of the project.

3.2. Categorization: Justification of the category of the EsIA in function of the environmental protection

During the assessment of the environmental impact of the project, it was identified that this affects the Criterion 1 of environmental protection in their paragraphs b, c, and e., so a study **category II.**

The Criterion 2 is defined when the project generates or presents a risk to the health of the population, flora and fauna and the environment in general. To determine the level of risk, consider the following factors:

B. The generation of flowing liquid, gaseous emissions, solid waste or their combinations whose concentrations exceed the maximum permissible limits established in the regulations of environmental quality;

C. The levels, frequency, and duration of noise, vibration, and/or radiation;

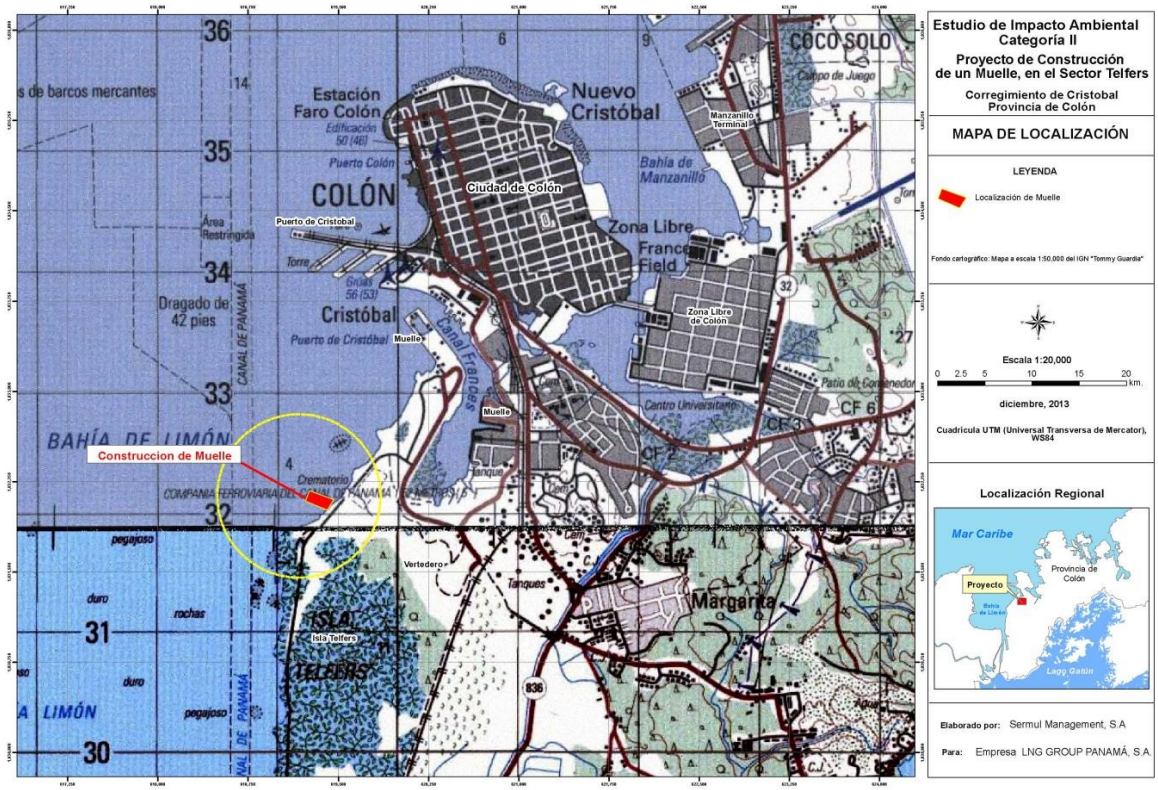
E. The composition, quality and quantity of fugitive emissions of gases or particles generated in the different stages of development of the proposed action.

4.0 GENERAL INFORMATION

Island Telfer is in the process of building infrastructure to accommodate the provision of services to the growing requirements of the shipping industry demand, particularly of the leased lines to fuel. For this reason, we must increase the available depths up to 14 m in the area of location or construction of the new pier, which is located in the eastern sector of the bay, on the island Telfer and the navigation channel.

The study area is located in the area of the Telfers Island in the province of Colon. The project, in its land area covers an area of approximately 40 hectares and includes a spring for receiving liquefied natural gas (LNG), designed to download methane tankers of 70,000 - 180,000 m3 of capacity. You will have 800 m long and may receive a capacity between 70 thousand and 180 thousand m ^{3}. The conditions for the use of the marine area, in general, are mainly related to maritime activities and
Port. Due to its location, you can receive input from freshwater product
The activities and proximity to the Panama Canal.

4-1: Spring Location



4.1 The Promoter

The project sponsor is LNG GROUP PANAMA S.A**,** whose backgrounds are detailed below:

- Public Register : : 691187 Doc.: 1725036
- Legal representative : **JOSE DAPELO BENITES**
- Passport : No. C488000
- Telephone : +507 394-7660 / +507 394-7661
- Fax : +507 394-5600
- E-mail : jfabrega@lnggrouppanama.com
- Physical Address : Punta Paitilla, Colunge Gil Street, House F-14
- Contact Person : **Lic. Julio Fabrega**

The company signed with the Panamanian State a lease and investment with an option to purchase 48 hectares of 5945.08 m ^{2}, divided into two lots, for a term of 40 years (Cabinet Resolution No.7 of 19 January 2010). The land is located in the sector of Telfers, Corregimiento de Cristobal, district of Colon, province of Colon.

4.2 Peace and issued by the Department of Finance of ANAM

In the Annex No.1 is attached the good standing certificate and the receipt of payment of the assessment of the EsIA.

5.0 PROJECT DESCRIPTION

As described above, Island Telfer is in the process of building infrastructure to accommodate the provision of services to the growing requirements of the shipping industry demand, particularly of the leased lines to fuel.

The study area is located in the area of the Telfers Island in the province of Colon. The project, in its land area covers an area of approximately 40 hectares and includes a spring for receiving liquefied natural gas (LNG), designed to download methane tankers of 70,000 - 180,000 m3 of capacity. You will have 800 m long and may receive a capacity between 70 thousand and 180 thousand m3. The conditions for the use of the marine area, in general, are mainly related to maritime and port activities. Due to its location, you can receive input of fresh water product of the activities and proximity to the Panama Canal.

The project consists of the construction and operation of a marine terminal of liquefied natural gas (LNG), which will be enabled to receive, download, store, regassify LNG and transport natural gas to ground, (Annex 2).

Basically, the regasification process consists of:

Transport: The Liquefied Natural Gas (LNG) is transported in a liquid state at -160ºC in special ships (tankers). The LNG carriers are extremely safe, thanks to its extensive security measures and its robust design (double). There has never been an incident in a boat tanker that has resulted in a loss of LNG.

LNG unloading LNG carriers: transfer the LNG to the regasification plant by unloading arms. The arms are the surest way to download fuels. The arms incorporate some safety valves that are practically non-existent potential LNG spills in case of emergency.

Transfer toward the tanks: The bombs of the LNG tankers driving the LNG from the boat to the storage tank through the unloading arms and a cryogenic (line that supports very low temperatures).

Storage: The LNG is stored at - 160 °C in a total containment tank. This tank is actually formed by two tanks, one within the other. The inner tank is cryogenic steel (which supports very low temperatures) and has a thickness of several cm. It is surrounded by insulating material and the outer tank, pre-stressed concrete of 1 meter thick. In the unlikely event that the inner metal tank suffered a leaking tank exterior concrete would retain the LNG and the vapors are stored. On the other hand, the tank's concrete exterior protects it from any cryogenic combustion event of neighboring plants that store fuel storage terminals of liquid fuels).

In summary, the terminal will have the capacity to berth vessels, where it will be stored and will be carried out the process of regasification plants. These vessels will be connected to the terminal and, considering the supply of a ship per month, you will have the ability to boost to ground the liquefied natural gas (LNG), delivering on the ground to a cryogenic storage tank of 175,000 m3, which caters to a regasification plant for

producing natural gas that is delivered to a branch or pipeline for distribution to final consumption centers.

Natural gas is regarded as one of the fossil fuels cleaner and friendlier with the environment. Its comparative advantage in environmental matters in relation to the coal or oil lies in the fact that the sulfur dioxide emissions are negligible and that the levels of nitrous oxide and carbon dioxide are much smaller. This property comparative LNG makes a contribution to sustainable development in the region.

The project, in addition to providing an infrastructure that will facilitate the provision of safe and reliable natural gas, economic benefits associated with the investment of capital for new projects, employment generation, creation of infrastructure, and generation of other income associated with the activity.

The works of the spring are shaped by an operational platform structured on the basis of a slab of concrete armed with dimensions in plant 40 m x 60 m and 45 cm thick, supported by metal beams TYPE IN100 connected rigidly with tubular steel piles of approximately 40" outside diameter and 22 mm wall thickness, kneeling on the seabed 34 m approximately. The seafloor in the sector of the platform has an elevation of -21 m NRS.

On the platform will be the arms for the transfer of liquid.
The berthing and mooring system is composed of the head platform described above, for a total of eight (8) dukes of Alba, six (6) mooring and two (2) mooring buoys and emergency exit.

For the maneuvers of entrance and exit of the aircraft to the terminal will be disposed of in land lights leading lines and anchoring constituted by a lantern guide on a support tube, while on the buoys and in the bow tie post end signaling lamps will be installed.

The gas will be sent to earth from one of the ships, via a steel line of 20" in diameter. To ensure the stability of the underwater pipe will have it prefabricated reinforced concrete weights, separated at a suitable distance away.

The maritime terminal considers the use of a boat of LNG to have the equipment necessary for the gasification on board, in compliance with the triple role of reception, storage and regasification of LNG.

It is important to note that there are two spring simulation studies carried out by the Center for Simulation, Maritime Research and Development (SIDMAR) of the Panama Canal Authority, and approved by them with the compatibility study granted (Annexes 4 and 5). For these studies, the main recommendations that emerged were (apart from the vast majority that dealt with maritime safety recommendations):

- The minimum depth under the keel should be 2 meters
- Environmental limits should be established as winds, tides and visibility. This is to ensure a safe margin to enable it to operate under most operating conditions
- The currents in the area must not pass of 1.2 knots
- The location of the spring should be away from populated areas and marine traffic

The above, was taken into consideration when the study was: Analysis of the hydrodynamic characteristics (currents, tides, waves). Site of the Spring Island Telfer, Colon Province, carried out by the specialist who worked in this EsIA (Annex 6). Within the main conclusions of this study, taking into account the recommendations of the two aforementioned simulation studies we have:

- The speeds in the construction site of the spring range from 0.03 to 0.12 m/s and are directed toward the SW 232° in situ measurements.

- The results of the model show that this is a body of water of weak speeds to the western end and anchor in the area of Puerto Cristobal like the French Channel. While, in general, the area of construction of the pier presents with moderate slightly speeds, between 0.09-0.12 m/s, with direction toward the SW.

- The maximum and minimum values of significant wave height are presented in the months of February and October respectively.

- The waves in the area proposed for the construction does not exceed 0.5 m high significant and comes from the WNW in its transformation. So that the dimension of coronation of the spring is enough to this condition.

- There are no significant changes in the behavior of the current direction and speed by construction of the pier.

- As you can see in Figure 2.2-1: PROJECT LOCATION, the same is away from populated areas and marine traffic

5.1. Objective of the project, work or activity and its justification.

The aim of the project is to **c**ount with port infrastructure necessary and efficient to perform the unloading, storage and regasification of liquefied natural gas (LNG) from a variety of sources. Once re-gasified, is injected into the existing network of gas pipelines in the region.

The justification of the project can be summarized in the following:

- Accommodate the provision of services to the growing demand requirements of the shipping sector, particularly of the leased lines to fuel

5.2. Geographical location including map in scale 1:50.000 and UTM coordinates or geographic polygon from the project.

The project will be developed in the land, given in concession, the company's LNG GROUP PANAMA S.A**,** in the corregimiento of Cristobal, district and province of Colon, see Annex 2.

The project is located with the following coordinates in UTM (lot of 8 hectares):

1031912 0620401 E and N;
1031708 0620446 E and N;
1031987 0620042 E and N;
1031982 0620206 E and N.

5.3. Legislation, standards, techniques and instruments of environmental management and its relationship with the project, work or activity.

This information is presented in the following table:

5.3-1: Legislation and technical and environmental standards that regulate the Sector and the project, work or activity

Legislation	Topic	Comments
Act No.1 of 3 February 1994, the Forestry Law	To establish the forestry legislation of the Republic of Panama and other provisions.	Establishes the procedure for the felling of trees. Resolution AG-0054-20004, which establishes the procedure for the clearing of grasslands.
Law 24 of 7 June 1995, Wildlife Law	."By establishing the Wildlife Legislation in the Republic of Panama". Published in the Official Gazette No.22,801, of 9 June.	Establishes sanctions for those who kill, capture, retain, trade or traffic in wildlife species.
Executive Decree No. 2 of 21 April 1997	Creates the Inter-Agency Technical Committee of Health, Occupational Health	Health, Hygiene and Occupational Safety for chemical substances.

Legislation	Topic	Comments
	and Safety	
Law No. 41 General of Environment, 1 July 1998	It sets out the principles and basic standards for the protection, conservation and restoration of the environment, promoting the sustainable use of natural resources.	Law that governs everything related to environment and natural resources in general
Decree Law No. 7 of 10 February 1998	By establishing the Maritime Authority of Panama, unify the various maritime powers of the public administration and other provisions are issued".	Creation of the Panama Maritime Authority (AMP)
Executive Decree 255 of 18 December 1998	Regulates Law No. 36 of 1996 (ART.7, 8 and 10) and introducing other provisions. Regulates the parameters of pollutants for motor vehicles and the measurement of opacity for diesel vehicles	Control Vehicular Emissions. Control of paints, lacquers, varnishes and other substances with lead content. Biological Exposure Index and allowable levels of pollution. Management and control of wastes.
Resolution No. 506 of 6 October 1999	By which the Minister of Commerce and Industry, approves the technical regulation DGNTI COPANIT 44--2000 Industrial Health and Safety.	Conditions of health and safety at work environment where noise is generated.
Technical Regulation 35-2000 COPANIT DGNTI -	"Amending Resolution No. 351 of 26 July 2000, which Approves the Technical Regulation 35-2000 COPANIT DGNTI -. Water. Liquid Effluent Discharge directly to bodies and bodies of water Surface and groundwater"	Liquid Effluent Discharge directly to bodies and bodies of water Surface and groundwater
Technical Regulation DGNTI-44-2000	Industrial Health and Safety, Hygiene and Safety Conditions in work environments where noise is generated.	Everything related to hygiene and safety in work environments where noise is generated
Decree No. 306 of 4 September 2002	By adopting the regulations for the control of noise in public spaces, residential areas or room, as well as in occupational settings.	Everything related to noise in public spaces, residential areas or room, as well as in occupational settings
Decree No. 1 of 15 January 2004	Which is determined by the noise levels for residential and industrial areas.	Everything related with noise in residential and industrial areas
Executive Decree No. 123 of	Which regulates the Chapter II	Decree that governs

Legislation	Topic	Comments
14 August 2009.	of Title IV of the Act 41 of 1 July 1998, General of Environment of the Republic of Panama.	everything related with the Environmental Impact Assessment Process
Law 44 of 31 August 1999	Which approves the limits of the Panama Canal Watershed	Boundaries of the Canal Watershed
Law No.44 of 23 November 2006	Creating the Aquatic Resources Authority of Panama	Creates the ARAP and everything related to coastal and marine resources and aquaculture.
Rules of Procedure adopted by Agreement No. 151 of 21 November 2007	Compendium of the regulation of the use of the area of compatibility with the Operation of the Canal and of the waters and shores of the Channel	Approved regulations on the use of the area of compatibility of the banks of the canal
Cabinet Resolution No. 7 of 19 January 2010	Approves the lease and investment with an option to purchase of a land area of 48 hectares for a term of 40 years.	Investment and lease with option to purchase
Cabinet Resolution No. 43 of 13 April 2010	You change the Cabinet Resolution No. 7 of 19 January 2010 by amending paragraphs 7, 8 and 12 of Article 2 and repealing section 14 of article 2 of the said resolution	Modifies the Cabinet Resolution No. 7 of 19 January 2010

5.4. Description of the phases of the project, work or activity.

The project in its development includes four phases: planning, construction, operation and abandonment. As this is an activity of construction of a pier, the stage of abandonment is unlikely, however, before the operation of the project will be all project areas clean and free of debris that have been produced by the activities of the project.

5.4.1. Planning.

In the stage of lifting of the information of field activities, among which we can mention:

- Collection of existing information and the conduct of preliminary field studies.
- The second stage consists of field studies of oceanology, among others.
- The research work includes studies of current capacity and feasibility of drinking water systems, sanitary service, electricity and communications.
- The preliminary geotechnical study produced an overview of the conditions of the soil.
- The collection of documents and data required through the National Geographic Institute Tommy Guard, for the field work, which includes the compilation of maps, research of existing utilities and identification of limits of artificial and natural project.
- Preparation of the environmental impact study and approval.
- Obtaining all permits with the corresponding authorities.

5.4.2 Construction/implementation.

Installation Tasks

Be established buildings, warehouses, deposits and other, located in a given area or any other sector, roofing or not, the purpose of which is oriented to the administrative and logistical support of the work, are these buildings such as offices, parking lots, warehouses, dining rooms, bathrooms for the staff, garages for the maintenance of vehicles, areas of collection, etc.

For these facilities is estimated using spaces for pre-assembly of piles and for temporary offices and facilities in the project area

The area for this activity is located in the sector of Telfers and cover the components required to meet operational needs, namely:

- Offices of the construction company and technical inspection
- Storage of materials

- Sanitary facilities, showers and dining rooms, according to the number of workers
- Parking garages, workshops, mechanical, electrical, and other.

Platform

S and activities of piling, welding, assembly of structures of steel, concrete, etc.

Mooring

For the mooring, the piling up of piles, welding, assembly of steel structures and concrete.

Spring Launch

Are the piling of stilts, welding, installation of structures in steel, concrete, etc., in order to build the quay for the launch of the pipe and spring. This spring aims to launch a controlled way the tubing to the sea for their subsequent navigation. Their use will be temporary, and will be built for the launch and dock services.

Structures on the ground to launch

Is the area needed for the manufacture and handling of the entire stretch of undersea pipeline, to perform the hydrostatic test. This activity corresponds to a typical test is performed for the launch of pipes as emissaries or pipelines to the sea.

Spring of Stranded

This front covers the activities of kneeling, welding, installation of structures in steel, concrete, etc., in order to build the quay of stranded. The main objective of this spring, is to allow the installation of the pipe in a trench built in the area.

Concrete ballast

The ballast of concrete will be developed on the ground while installing the structures of launch of the pipe. In this way, at the time of being required for placement on the pipe is ready. These will be installed on the tube, prior to the launch of the pipe. The project does

not consider the installation of a concrete plant, so this will be acquired to companies that have the necessary authorizations.

The activities mentioned above, the field work is relevant from an environmental point of view, since the actions that will be taken for the physical works of the project, constitute potential sources of impact.

Table 5.4.2-1: activities or actions of the project and duration in the Construction Stage

Actions	Duration of its Effects (Permanent or Temporary)
Hiring of labor	Temporary and Permanent
Movement of equipment in work (heavy and light)	Temporary/Permanent
Fixed machinery operation	Temporary
Fetching water for domestic use	Temporary
Signaling	Permanent
Domestic solid waste management	Temporary
Domestic liquid waste management	Temporary
Installation /Generation of Activities and Services	Temporary
Vehicle traffic entering the project	Temporary

Hiring of labor

For the implementation of the project works (construction and operation), will require temporary labor and permanent. The first referred in particular to working positions offered for the construction of the project and the estimation of indirect jobs that this will lead, which have been estimated to total 120 to 170 jobs per month , direct and indirect jobs during the operation stage of the project about 40 to 60 new direct jobs and indirect.

Loading and transport of construction materials and equipment

Be Used trucks of various sizes. The fuel in the diesel equipment is usually. However, they will also be used computers to gasoline.

Vehicle traffic entering the project

The traffic of vehicles that will access the project will increase the volume to exist in the area of the community, and at the present time do not hinder the track and the daily circulation of the sector, do not cause danger, injury or unnecessary inconvenience to persons, or damage to property.

Fixed machinery operation

Special care will be taken in controlling the potential emissions and spills liquids or solids, so as to ensure the safe operation and non-polluting . Be established in areas that allow for the containment and treatment of spills in the event occurs, which is provided for in the Contingency Plan.

Physical protection of soils

During the phase of the construction of the pier, special care will be taken to produce any type of removal of soil and in the event that any spill, soils will be properly managed according to the existing standard.

Arborization

Does not apply

Fetching water for domestic use

The project will not have a significant demand for drinking water. In the maritime area, all vessels involved, will have their own equipment for water distribution that respond to the demands of the crew and the health authority. These vessels belong to contractors who are required to have drinking water, in quantity and quality required by the health authority.

For its part, on the ground, the installation tasks will require a lower quantity of drinking water, which will be provided in dispensers with bottles of 20 liters. In addition there will be a temporary tank of 500 liters of drinking water, most of which will be used in the

health services. The distribution network will have a water purification system to ensure compliance with the regulations in force.

Signaling

It marked the areas of work and those that are risky, indicating the precautions and safety measures which must be met.

Informational signs, such as the name of your site. Preventive measures, such as signals the signals from hazardous areas.

Management of water drainage and rainwater

Does not apply

5.4.3. Operation.

During the operation stage of the spring, it is expected that there will be changes in the conditions in which the marine benthos, except that temporarily cause the boat propellers in relatively shallow areas at the time of berthing. However, these effects on the benthos should be minimal and temporary. The same is true with the periodic maintenance of the canals and docks.

During the operation does not expect major changes or effects on pelagic organisms, as these are often subject to maintenance activities and for relatively short periods.

5.4.4. Abandonment.

It is not considered stage of abandonment in this project, however, once the construction phase and before starting the operation of the project, will be leaving the place totally clear of debris and completely clean will all project areas clean and free of debris that have been produced by the activities of the project.

5.4.5. Schedule and run time for the construction of the pier

According to what is established in the lease and investment, the implementation of the project will be carried out according to the schedule attached.

Table 5.4.2-2: Schedule of Activities of the Project

	Tasks	Duration Days	Home	End
1	**Government permits and authorizations**	90	01/10/2014	31/12/2014
2	**Financing**			
	2.1- Negotiation Conditions	120	01/01/2014	30/04/2014
	2.2- Signing Contracts	60	01/05/2014	30/06/2014
3	**Engineering**			
	3.1- Spring and Port Works	90	01/07/2014	30/09/2014
4	**Supplies**			
	4.1- Spring and Port Works	150	01/03/2014	31/07/2014
5	**Construction and Mounts**			
	5.1- Spring and Port Works	270	01/06/2014	31/03/2015

The total amount of the project will be: B/ 25,000,00.00 (Twenty-five million with 0/100 of balboas)

5.5. Infrastructure to be developed and equipment to be used

In the construction phase of the project will be established buildings, warehouses, deposits and other, located in a given area or any other sector, roofing or not, the purpose of which is oriented to the administrative and logistical support of the work, are these buildings such as offices, parking lots, warehouses, dining rooms, bathrooms for the staff, garages for the maintenance of vehicles, areas of collection, etc.

For these facilities is estimated using spaces for pre-assembly of piles and for temporary offices and facilities in the project area, which could affect the landscape.

Specifically be used the following equipment:

- Structural cranes
- Inca piles martinete
- Cranes torres
- Structural or static tower cranes
- Compaction machines
- Dynamic compaction
- Bull doser
- Tipper trucks
- Pick-ups
- Concrete mixer,
- Paver
- Curling design pieces to make the breakwaters.

5.6. Input requirements during the construction/implementation and operation.

During the **construction** will use planting of stilts, compacting pick-ups and trucks for the transportation of fuels, among other

During the **implementation and operation shall** be used, boats, ships, trucks for the transportation of fuel, among others.

5.6.1. Needs of basic services (water, energy, sewage, roads, public transport, other)

The project does not require drinking water to more than the necessary for people who work in the construction and operation of the project. The same happens with the energy, sewage, etc.

Transport and communications

It will carry out the works required for the connections of the telecommunication systems and data transmission.

Aqueducts

There are facilities for the supply of potable water in the area and the I.D.A.A.N. is responsible to provide the system, if necessary.

However, the project will not have a significant demand for drinking water. In the maritime area, all vessels involved, will have their own equipment for water distribution that respond to the demands of the crew and the health authority. These vessels belong to contractors who are required to have drinking water, in quantity and quality required by the health authority.

For its part, on the ground, the installation tasks will require a lower quantity of drinking water, which will be provided in dispensers with bottles of 20 liters. In addition there will be a temporary tank of 500 liters of drinking water of support which for the most part will be used in the health services. The distribution network will have a water purification system to ensure compliance with the regulations in force.

Electricity

During the process of building self-supplied energy is used more than the available in the public network. During the life of the project the electrical energy will be similarly self-supplied.

5.6.2. Labor (during the construction and operation), direct and indirect employment generated

In the **construction phase you** will need the following staff (skilled and unskilled):

- Civil Engineer with specialty in health care,
- Civil Engineer
- Inspectors,
- Administrative Staff (Manager, secretary, etc.),
- Foreman.

In the stage of **operation** will require the following personnel:

Manager	1
Supervisors	3
Wizards Of Operations	3
Assistant Manager	1
Cleaning Staff	2
Security	6

5.7. Handling and disposal of wastes in all phases.

5.7.1. Solid.

In the **construction phase,** the solid waste that this project is going to produce are:

- Material Product of the construction of the pier, which shall be deposited in the sites that are set out below.
- Household waste generated in places of rest and feeding of workers (food, paper, cans, plastics, and others). These waste will be deposited in the nearest garbage dump.

These wastes are removed on a daily basis, of the place of work, construction debris, waste materials, packaging materials and other similar. Any dirt or mud that has fallen on the road will be cleaned. No one will be allowed to burn as a method of waste disposal. It will comply with the laws of the Republic of Panama concerning transport and waste disposal. The solid waste produced by the staff of the contractor shall be transported daily from the site of the work to the nearest landfill.

In the **operation stage**, the solid waste that will be generated by the usual activities aboard the terminal, are the following:

- Maintenance Waste (rags with grease, etc.) generated only during the events of preventive and corrective maintenance.
- Household waste or comparable to domestic waste, such as paper, packaging waste, etc.
- Empty containers of solvents, paint cans and solid hazardous wastes in general, also sporadically.

The non-hazardous waste are allowed (organic waste, plastic, cardboard, paper, aluminum and glass) and the remains of building materials (metals, welding, wood, gravel, etc.).

Hazardous waste is from stuffing box with oil and solvents, containers and empty containers of hazardous materials, cans of paint, brushes with paint, batteries. Include as hazardous waste to the hospital waste that will be generated for care in the vessel to ill or injured employees, such as syringes and gauze pads. The volume of hazardous waste generation during this stage will depend on the intensity and duration of maintenance activities.

The stage of **abandonment** for this project is not, however, before the operation of the project will be all project areas clean and free of debris that have been produced by the activities of the project.

5.7.2. Liquid

In the **construction phase,** it is expected that the proposed project will generate the following liquid waste:

- Possible spills of hydrocarbons and fuels from the equipment used for the construction of the pier.
- Fluid from the physiological needs of the workers who will work in the construction of the project. Provide staff with portable toilets, waste will be collected by a contractor who meets the standards of disposal of waste water and sludge. These will be removed in accordance with the contractor for this task and waste generated is deposited in authorized areas that comply with the standards of wastewater disposal.

In the **operation stage of** liquid wastes that are generated are:

- The wastewater generated by the employees and from health services and sink installed in the administrative office.

It is not considered the stage of **abandonment,** for this project, however, before the operation of the project will be all project areas clean and free of debris that have been produced by the activities of the project.

5.7.3. Gaseous

In the **construction phase,** the gaseous waste that are generated are the gases of the combustion products of the operation of the equipment used. These emissions are minimal, since this team consists of systems of control of exhaust gases.

In the **operation stage of** the main source of gaseous emissions be given during the berthing of ships and movements of trucks with inputs

5.7.4. Dangerous

Hazardous waste will not be generated during the construction and operation of the project.

5.8 Consistent with the Land Use Plan

The area where you will build the Pier, corresponds to an area where they have already been carried out similar activities.

5.9 Overall amount of investment.

The estimated investment of the work is of B/. 25,000,000.00 (Twenty-five million with 0/100.

6. Description of the physical environment

This chapter contains the history of the area of influence or baseline of the project, in accordance with the provisions laid down in Article 27, *"Minimum Contents/Terms of*

Reference, the Environmental Impact Study", Studies Category II, of the Executive Decree No. 123 of 14 August 2009 [3] .

The base line describes the components and environmental elements considering the positive and negative environmental impacts significantly adverse effects that may be associated with the project, as a result of activities and actions to be executed for the construction and operation of the project.

The description of the area of influence is systematized by the environment and environmental component that is being analyzed, considering the following classification:

[3] decree which regulates the Chapter II of Title IV of the Act 41 of 1 July 1998, General of Environment of the Republic of Panama."

6-1: environmental components that govern the Environment

East	Components
Physical	Climate
	Meteorology
	Hydrometeorology
	Air Quality
	Geology
	Geomorphology
	Soil Science
	Noise
Biological	Flora
	Fauna
Human and Cultural	Socio-economic
	Economic Activities
	Land use
	Property, Land Tenure and Land Value
	Basic equipment and infrastructure
	Territorial
	Protected Areas
	Cultural Heritage

The environmental components and elements are described for the whole of the cartographically project, identifying each one of them when possible.

The bibliography and other sources of information, detailed in Section B - Executive Summary.

For the purposes of analysis, is identified as an area of study, formed by the Project Area (location of the project) and its area of influence, the latter subdivided into area of direct and indirect influence.

6.1. Regional geological formations

The plains of the coast of Colon, where the project, belong to the group Aguadulce training Rio Hato (QR - Aha) and lithological composition is characterized by the presence of conglomerates, sandstones, shales, tobas, sandstones are not consolidated and pumice. These materials belong to the group of sedimentary rocks, which for the training Rio Hato and Gatun Locks sedimented at the end of the Quaternary period (approximately 10.000 years ago), within the recent epoch, known as the Holocene epoch of the Cenozoic Era.

The lithological conformation of the area has been influenced by the volcanic processes of the activity of the "Valle de Anton", which can be seen through the presence of tuff and pumice; the participation of mechanical and chemical processes that have developed sedimentary rocks of the place.

The most abundant types of sedimentary rocks belong to the group of "Terrigenas Clastic", which are made up of fragments that come mainly from the disintegration of silicate rocks. To this group belong the Terrigenas clastic rocks shales, sandstones and conglomerates present in the area. The most plentiful type of these rocks are shales, which are formed mainly by microscopic particles of silt and clay, in this way, depending on the content of organic matter and iron oxides, shale present a variety of colors including black, purple, red, brown, green and gray (as can be seen in the area). The shale is not a rock and by the time has not been removed much value from it; with the exception of its industrial importance as added ground coffee in the manufacture of concrete.

The presence of conglomerates and sandstones is given by the existence of pebbles cemented of fine materials, such as silt, sand and gravel. The cementations are usually the iron oxide, carbonate, and loamy materials sometimes silica. It should be noted that some types of sandstones are very resistant and are used as construction materials.

6.1 local geological units 1.

The stratigraphy of the area of the development of the project, in the top[4], is characterized by non-consolidated sediments, filled with sand and corals. Underlying in addition, formations of lacustrine sediments [5] (sediments Holocenos), made up mainly of silty sand, silt and organic clays. Underlying lacustrine sediments, we find the rock mother, specifically of the Gatun Formation, which is made up of sandstone of medium to fine grain, shales, siltstones, hardboard, sandy clay and tuff. This Training "Gatun" is the one that predominates in the project area. At the top of this stratum, the rock is characterized by being of hardness soft to medium soft and at greater depth the rock is moderately hard. It is a rock of low resistance to the simple compression and due to its low hardness, can you dig with relative ease.

6.2. Geomorphology

Does not apply to EsIA Category II.

6.3 Characterisation of the soil

6.3.1 Description of the use of the soil

The soil has a use of similar operations to the project (later the construction of the pier) such as Atlantic Pacific, S.A. (APSA) in the storage of fuel from the Atlantic Coast and the PETROPORT with the storage of Liquefied Petroleum Gas which are neighbors of the area selected in the Telfers Island.

We also develop activities of the authority of the Panama Canal and Panama Ports Company.

[4] Geological Map, Republic of Panama, Ministry of Trade and Industry, Mineral Resources, 1991

[5] Geologic Map of the Panama Canal and Vicinity, Republic of Panama, 1980

6.3.2 Demarcation of the property

The area is made up of **LOT B** , of 78,911.85 m ^{2} , with 30106-118990 Approved Level, and the **polygon you04-01** of 400,000.00 m ^{2} , with 30106-118989 Approved Level, which together have a area of 478,911.85 m ^{2} , which are part of the Farm No. 12875, inscribed in the roll 18.598 1 document, in the section of the Interoceanic Region, Province of Colon, of the Public Registry, located in the sector of Telfers, township of Cristóbal, district and province of Colón. (See Appendix No. 1. Disclaimer The property).

6.3.3 Capacity of use and fitness

The agrological capacity in the area of the project, corresponds to soils of class V, VI and VII (according to the classification of the Soil Conservation Service of U.S.A.), and based on this classification is the ability to use is described below:

Class V:

With gentle slope, eroded soils severe flood hazard, frequent, shallow soil depth, flooded with poor drainage, ease of tillage of soil salinity, regular moderate to severe, adverse weather (very wet), the practices of crops are possible on an occasional basis or are not possible, stoniness low.

This kind of soil is not suitable for crops, but it is appropriate to maintain permanent vegetation as natural forests, reforestation, grassland and maintenance of wildlife. They are soils almost plains with one, or more of a limitation of the following type:

- Standing Hidromorphology, even with drains.
- Frequent flooding by water courses.
- Severe climatic conditions.

Class VI:

Suitable soils to support a permanent vegetation, being able to devote to pastures or forests with moderate restrictions. They are not suitable for cultivation, and the severe limitations that restrict their use to grazing, forest masses and maintenance of wildlife.

They are soils with uncorrectable permanent constraints such as:

- Susceptible to severe erosion.
- Acute effects of erosion in the past.
- Shallow rooting zone.
- Excessive humidity or inundabilidad.
- Low water retention capacity.
- High salinity or alkalinity.
- Severe weather factors.

It is usually necessary to implement improvement measures for pastures, such as seeds, fertilizers, whitewashed, drainage practices, such as furrows to level, named pipes, or practices of both types at the same time. The poor state of these soils can lead to depletion of the vegetation.

Class VII:

They are soils appropriate to maintain a permanent vegetation with severe restrictions. Have very severe limitations that make them unsuitable for crops and restrict their use, grazing, to the forest masses or to the maintenance of wildlife. The restrictions are more severe than those of the soils of the Class VI. Permanent limitations is difficult to correct such as the following:

- Very high erodibility.
- Surface soils of very thin.
- Stony high.
- Standing Hidromorfology.
- Very high salinity or alkalinity.

- Unfavorable weather.
- Other very severe limitations.

These soils may not be used with freedom for grazing, except that apply management practices such as fertilization, careful regulation of grazing, replanting for protection. It is recommended that most of these soils are intended for forests, more than to pastures, in which case it shall exclude livestock and prevent fires. Are not appropriate for agricultural crops, pasture or commercial reforestation. To be classified as areas of natural protection.

The project area has traditionally been used for activities related to the adjacent port facilities and distribution of liquefied gas. Prior to and during the Second World War, specialized initially for management of solid waste.

He was abandoned by the Navy of the United States about 1.950 and since then operates a landfill without the conditions of treatment.

Except this type of activities, it had not been given another use to the soils in the project area until, once transferred by effect of the Canal Treaties, the State assigned to use, as described in land use.

With respect to the area of the disposal of waste, we can say that the direction of flow at that distance is independent of the state of the tide or atmospheric condition present, that is to say that there was no decisive influence of the tide in the configuration of the workflow, or wind, because it has a sustained pattern with a NE direction and JAN. The current presents a single steering group between SE-jan (20º-80º), and the 60% frequency current is directed toward the 70th. Later we will go deeper on this topic.

6.4 Topography

The description of the topography of the terrain where it will locate the project indicates that elevations in meters above sea level range from 0 to 2 meters above sea level in the lower elevation sites located in the coastal areas of the Caribbean Sea.

6.4.1 Topographic Map

See Annex 3. Topographic map 1:50.000

6.5 Climate

The climate that is presented in the study area, is determined by the influence of the oceanic masses, mainly in this case, the Caribbean Sea. The high humidity is an example of this, determining the properties of temperature of the air masses circulating between the oceans.

According to the Köppen classification system, of the three (3) Climatic zones that exist in the Canal Watershed in the project area is considered to be tropical wet climate (AWI), which is characterized by a higher average annual rainfall of 2.500 mm, a summer of three (3) months and an average annual temperature between 24° C and 26° C.

The meteorological features of the area of influence of the project, described for the elements: temperature, precipitation, and wind. This information is useful for establishing basic conditions for the design, construction and operation of the project must have.

Factors that determine the climate

- Geographical situation and relief
- Oceanography
- Meteorology

Climate classification according to W. Copen

Rainfall regime by region

Pacific Region: It is characterized by abundant rains, moderate to strong, accompanied by electrical activity that occur especially in afternoon hours. The rainy season starts in the month of May and lasts until November, with the months of September and October the rainiest; within this season is often presented a dry period known as Indian Summer, between July and August.

The period between December and April is the dry season. The highest rainfall in this region are usually associated with atmospheric systems well organized, such as waves and cyclones tropical depressions, tropical storms and hurricanes), and the ITCZ. (Http://www.hidromet.com.pa/descripcion_gen_clima.html).

Temperatures in Panama respond to the geographical position of the isthmus, whose low latitude places in regions with tropical climate.

The most outstanding feature common climate in these regions is the absence of a cold season, a condition which is reflected in the annual difference between the temperature of the warmest month and the month more fresh. This denotes a great thermal uniformity between the various months of the year and between one place and another.

In the tropics, the lift is the only factor capable of producing large temperature differences over short distances between two places, seriously affecting the predominant thermal uniformity.

Weather and Meteorology

General Information

In the last two decades, the weather has been presenting major changes in his behavior, such is the case, for example, of the more frequent occurrence of phenomena such as El Niño, and droughts.

Temperature

The temperature is a meteorological element that influences the different atmospheric processes and in the ecosystem. Extreme temperatures, i.e. the maximum and minimum, present a variability that depends on atmospheric elements, of the topographic settings and oceanographic and atmospheric conditions (dry and rainy seasons, cloud cover, wind direction atmospheric stability, surface temperature of sea water and soil moisture, etc.), usually the minimum temperature it occurs around the time of sunrise and the maximum temperature after noon.

The average annual temperature registered is of 26.88°C, with an absolute minimum temperature that goes up to 18.88°C between the months of November and December, and an absolute maximum temperature reaching 52.5°C, registered in the months of May and October. However, the minimum and maximum averages for the year are located at 24.55°C and 29.33°C, respectively, which shows a thermal gradient averaged approximately ± 2.4°C.

Precipitation

In general, the rainy season is beginning in the month of April and ends in the month of November to December; but is mainly concentrated between the months of October and November.

Relative humidity

In this region, the value of the Relative Humidity, indicates the degree of "saturation" of atmospheric humidity in the air, which is mainly related to the temperature of the air.

Evaporation

In this area the evaporation occurs in every moment and in every type of surface.

Evaporation is conditional upon the following factors:

The temperature: very important factor, being the amount of evaporated water a direct function of the temperature.

- Degree of saturation: the ability of the air to support steam; the evaporation will be faster in a dry air and slower in moist air.
- The wind: the air to move drag the evaporated water and maintains the degree of saturation at low levels, which favors the continuity of the evaporation.
- Evaporation Surface: the higher the evaporative surface area, the greater the evaporation.
- Composition of water: water quality intervenes in the evaporation, if the water is pure, evaporation will be higher; if the water contains solutes evaporation is less comparatively.

During the occurrence of El Niño episodes of moderate or high intensity, or in the event of a warming of sea water, the temperatures are increased in 2° or 3°C more of magnitude. On the other hand, when the girl episodes occur or there is a cooling of the sea, the air temperature decreases depending on the intensity of cooling the temperature of the sea.

6.6 Hidrology

In the project area will not be affected constant sources of water.

6.6.1 Quality of surface waters

Within the field where the aim is to develop the project, there is no surface water courses, so this point does not apply, however, to determine the quality of the water in the area of study, monitoring and analysis physical-chemical and bacteriological samples of sea water in two points of the project (see annex 9, "Lab Results"). The same is carried out by the Research Center CIQSA, S.A. (Chemical).

To assess the quality of surface waters, we used the maximum allowable parameters set out in the "Technical Regulations of the General Direction of Standards and Industrial

Technology of the Ministry of Commerce and Industries DGNTI-COPANIT 35-2000. Water "Liquid Effluent Discharge directly to bodies and masses of surface and underground water" and the maximum permissible values according to the "Technical Regulations of the Panamanian Commission for Industrial and Technical Standards (COPANIT)".

- **Physico-chemical Quality**

To determine the quality of the water on the site, analyzes of the physical and chemical parameters of pH, color, temperature, turbidity, conductivity, total solids, suspended and dissolved, total hardness, sulphates, nitrates, total phosphorus, BOD5, COD, hydrocarbons, oils and fats, among others, to the seawater samples taken. (Annex 9)

One of the samples was made of sea water in the buoy 65, the start of the project, and the other was taken in the buoy 705, middle part of the project.

On the basis of the results obtained in the physio-chemical quality parameters, corresponding to: pH, total solids, dissolved solids, total suspended solids, chemical oxygen demand (BOD_5), dissolved oxygen, turbidity, hydrocarbons, oils and fats, are below the permissible values set out in the Technical Regulation 35-2000 DGNTI-COPANIT, (within the norm).

- **Bacteriological quality**

The bacteriological analysis of the samples of sea water in the buoy 65, give as a result that, in both Total Coliforms, Fecal Coliforms, exceeded the standard. In the case of the sample in the buoy 705, Total Coliforms are exceeded in the norm, while coliforms no.

Because of the alteration and the negative impact of human activities (deforestation, intensive commercial and port developments, development, pollution by garbage, dumping of sewage, etc.) can be seen in the results in annex 9, that although many of the parameters are within the norm, they are very close to the permissible limits, and in the case of coliforms, in general exceed the norm.

6.6.1. a. Flow rates (maximum, minimum and average annual)

Within the field where the aim is to develop the project there is no surface water courses, so this point does not apply.

6.6.1. b. Tidal currents and waves

The characterization of a particularly, the hydrodynamics of a coastal area, are of primary importance to understand how the environment, especially when you want to build infrastructure, maintenance or improvements.

Currents

In general terms, the coastal circulation system of the Panamanian Caribbean has been the surface current in the Panamanian Caribbean is directed toward the East throughout the year, parallel to the coast formed by the against the current of Panama and its speed varies from 0.5 to 1 knots, sometimes reaching 2 knots.

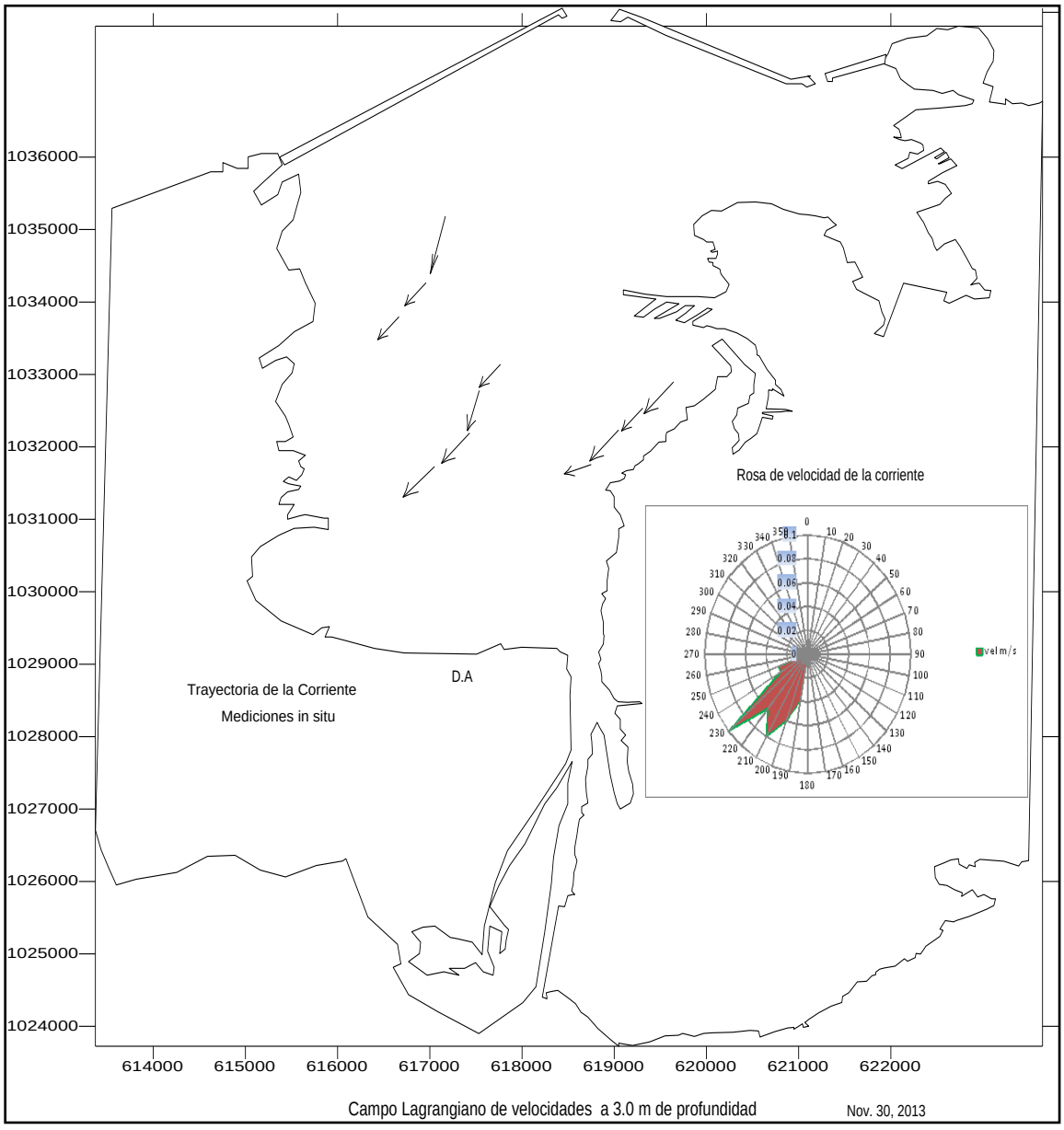
Site Construction of the pier

The Lagrangian flows observed in this opportunity in the domestic sector of the Bay, in figure 6.6.1 shows the path of the current, which showed an intensity between 0.03 m/s to 0.12 m/s, during the measurement period and under the conditions prevailing at the time. The same follow the direction toward the SW-SSW in the internal part of the bay, which represents a discrepancy with the heights and state of tide with the Predicted tidal in the table, possibly due to the radiative forcing effect exerted by the wind in the area, together with the weakening of the tidal currents by effect of the breakwaters of entry and little

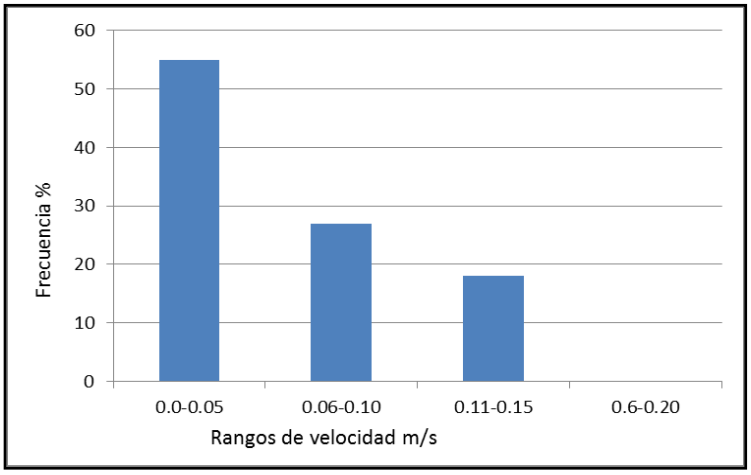
variation in the heights of the tide. However, it is likely that flows during changes in sea levels and in the face of a weakening of the wind field follow the direction of the fluctuations of this.

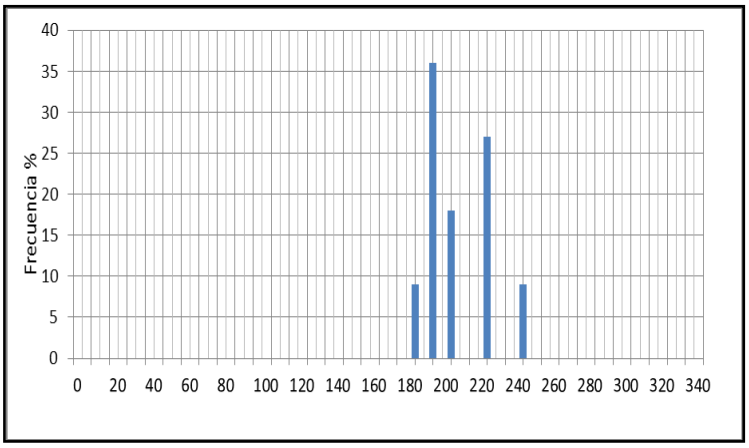
The frequency histograms of intensity and direction of the currents respectively are shown in figure 6.6.2, it was noted that the 55% the intensity of the current fluctuated in a range of very weak to weak, not greater than 0.05 m/s, while a 27% of the total registration exceeded this value and remained in a range between 0.06- 0.10 m/s. The 18% of the intensity of the current does not exceed the speed of 0.15 m/s. Therefore, the recorded speeds on that site are considered weak. While in the field directional flows were a 36 % toward the SSW, 200° and a 27% toward the SW 230°.

6.6.1: Field Lagrangian velocities and direction, site of Pier and adjacent areas.



6.6-2: frequency histograms of intensity and direction of the currents





Hydrodynamic Modeling

To simulate numerically the hydrodynamics of the site of the project site, and get a clear evidence of the temporary space distribution of the velocity of the flow and ebb of water induced by the tide, applies the hydrodynamic numerical model of Goto et al [6] (1997) IUGG/IOC, which consists in the integration of the central finite differences of the equations of conservation of mass and time for long waves in shallow water.

Are considered as input limits the results of measurements of flows described above through Lagrangian drifters traces in the site, during the flow of the tide of square carried

[6] Goto, C.,Ogawa,Y,Shuto N., and F . Imamura, 1997. IUGG/IOC Time , Numerical Method or Tsunami Simulation with the Leap-Frog Scheme, Oceanographics Intergovernmental Commission of UNESCO. Manuals and Guides # 35. Paris, 4 Parts.

out the 30 of November of 2013, and selects a maximum of Sicastenic scenario in a state of mid tide down. The grid has 5500 nodes, covered by a total of 100 x 55 nodes evenly spaced equidistant with Δ x = Δ and =100 m. (Arauz 2013). While, the modeling of the bathymetry was obtained from the nautical charts 26068 North Coast Panama Canal Port of Cristobal and the depths to the mean sea level, according to the tide of the Cristobal, as with the local bathymetry, (2004, bathymetric map, provided by the company).

Figure 6 .6-3: local bathymetry modeled

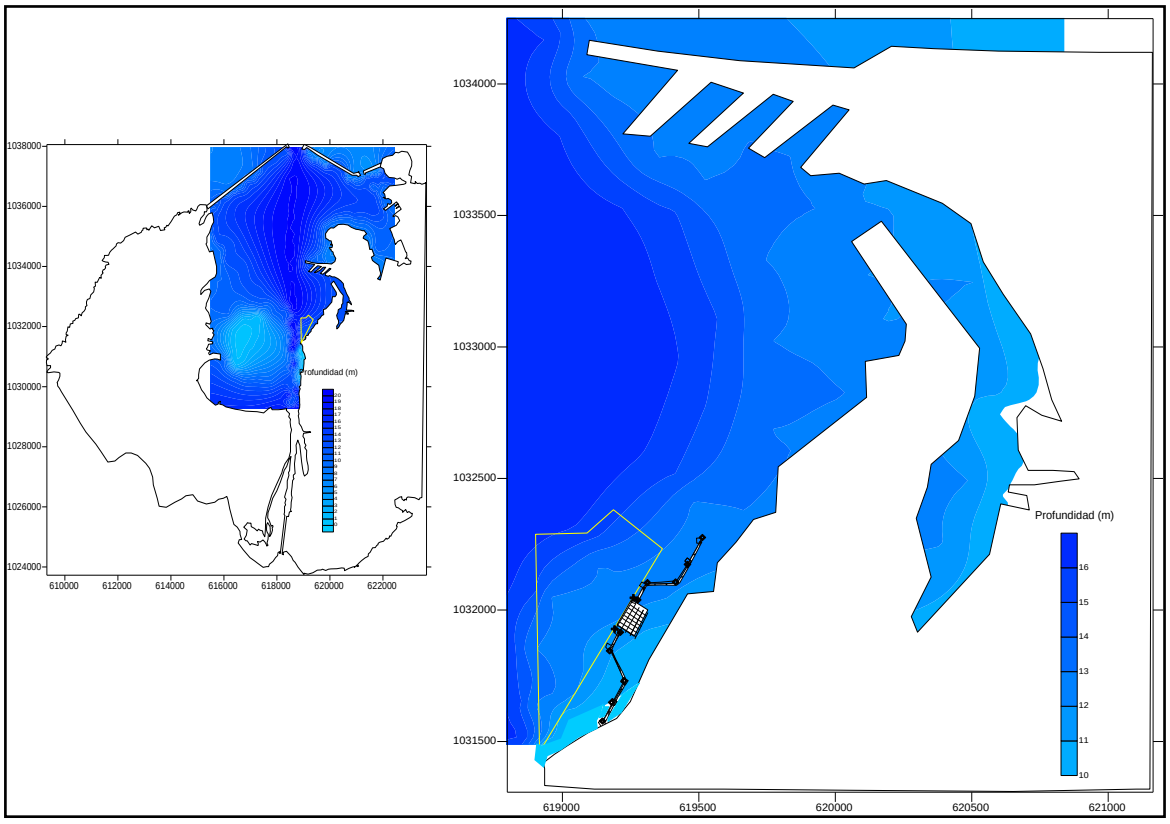
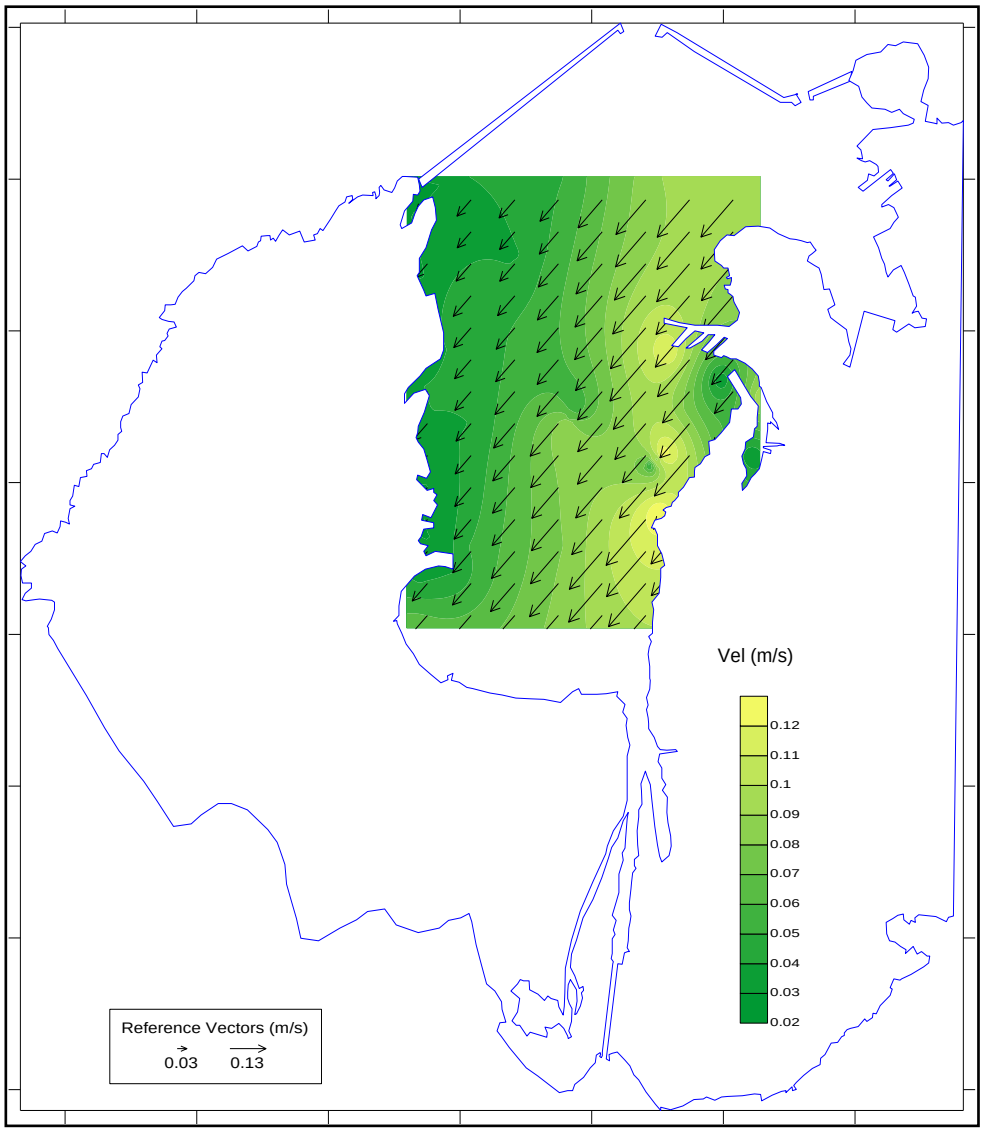


Figure 6.6.4. Modeling of currents during tide of syzygy media down



It is important to note, that the circulation pattern observed is determined in greater intensity by the climatology and to a lesser extent by sea levels. The speeds range from 0.02-0.12 m/s. The results show that this is a body of water of weak speeds to the western end and anchor in the area of Puerto Cristobal like the French Channel. While, in general, the area of construction of the pier presents with moderate slightly speeds, between 0.09-0.12 m/s, with direction toward the SW.

The characterization of the currents basically is similar across the Bay, resulting in the following:

- There is a stream of weak to moderate with average intensity of 0.08 m/s (with influence of wind in Lemon Bay).
- The range of the internal currents obtained was of 0.03cm/s to 0.13 m/s.
- The direction of the current models was consistent of 210º, which indicates that the current flows to the SW, under those conditions.

Waves

In the annual cycle is a bi-modal behavior of the significant wave height (hs) with a more intense between (Dec, Jan, Feb), which is the dry season in the region and a little weak between (Jun, Jul, Aug), which is due to the presence of the "Veranillo de San Juan" (Bernal et al., 2006) in the Caribbean.

The weakest period of significant wave height is between the months of September, October, November, which is the period where it occurs in the wet season and where the trade winds reach minimum values in the coastal areas of the Caribbean. The maximum and minimum values of significant wave height are presented in the months of February and October respectively for the buoys, virtual and in situ (Panama- Colon) employed.

This behavior is consistent with the climatology of the Caribbean, since the main dry season occurs from December to April and the wet season during the rest of the year, interrupted by a relative minimum in July and August, popularly known as the "veranillo de San Juan". The dry season, as well as the "Indian Summer", are associated with the NE trades and the wet associated displacement of the ITCZ to the north allowing the passage of the trade winds from the southwest.

6.6-5 Annual significant the buoy Colon

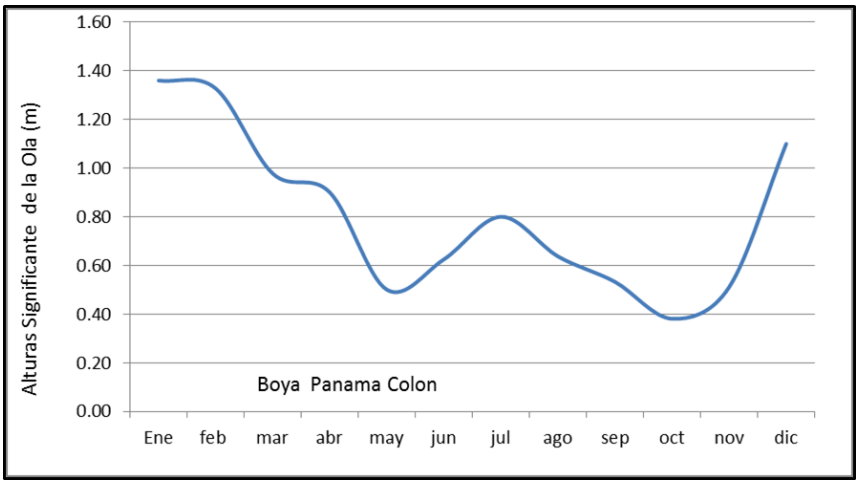
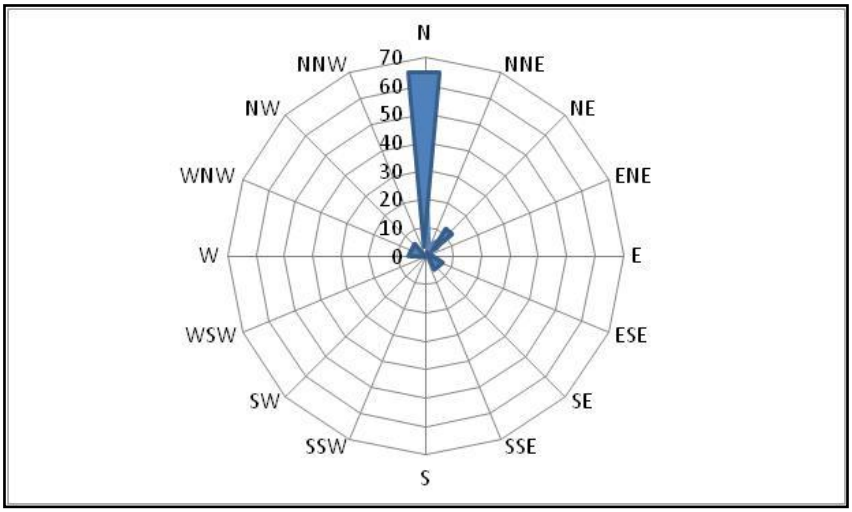


Figure 8: Cycle of height in Panama-

Figure 6.6-6: Rosa 9 of Swell Direction in the buoy Panama-Colon

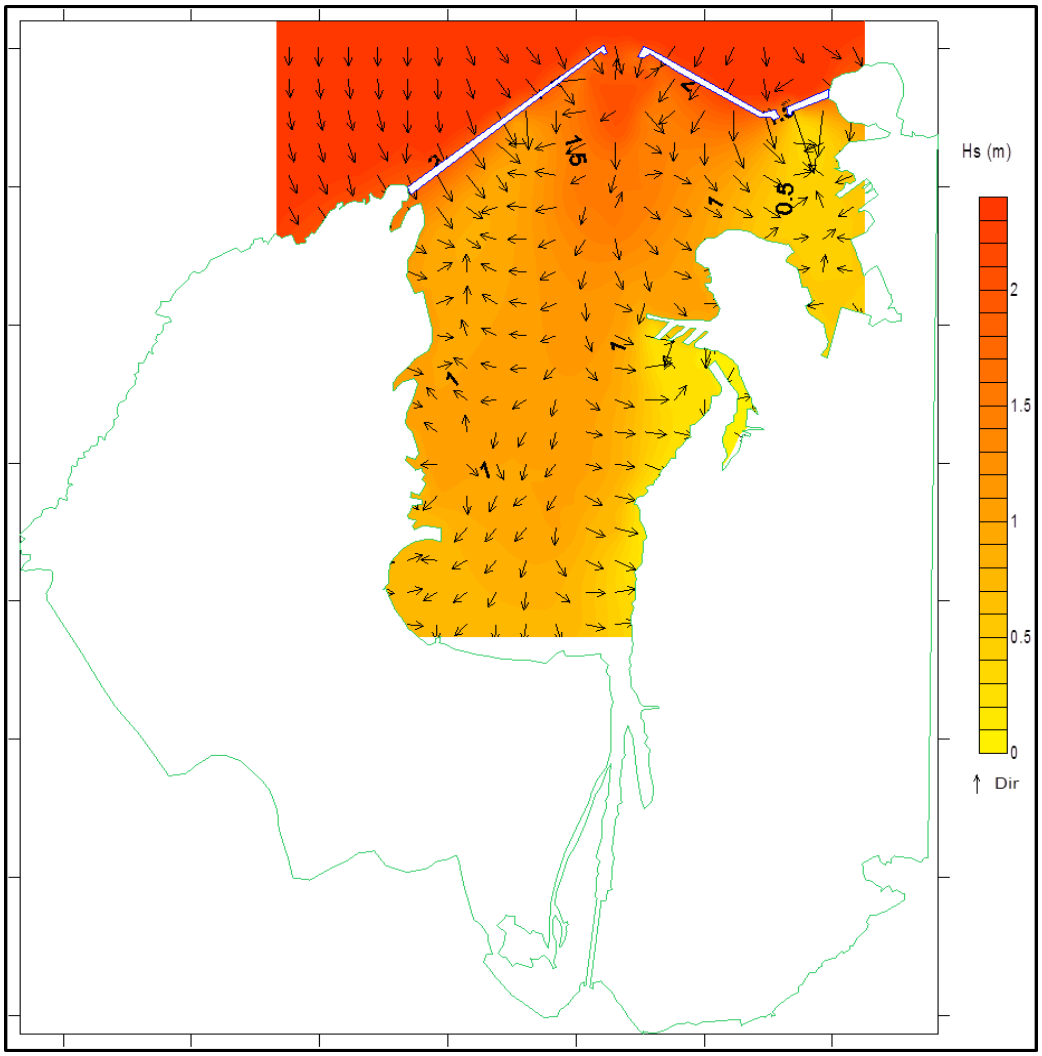


In the buoy close to the coast there is a greater directional dispersion, but north swells are predominant with 65%, followed with waves from the Northeast Southeast 10 %, with a 5% of occurrence as well as the West Northwest.

Propagation of the wave within the Bay

The scenarios chosen for these simulations correspond to events of wind wave of 3.0 m of significant heights associated with return periods of 20 years in deep waters, which have emerged from the analysis of average values between the months of December, January, February the Virtual Buoy, considering the most unfavorable propagation directions according to the orientation of the coast (Jan and N).

6. 6-7: Average significant wave height (modeled) (Dec, Jan, Feb, in the Bay and site of construction of the pier (Araúz, 2013).



In figure 6.6.7, as a result of the modeling can be noticed, that swell in response to the spatial and temporal variability of the prevailing winds in the Caribbean and the roughness of the fund. It is noted as the major significant wave heights (Hs) come from the N and NE at the entrance of the channel (seawall) as part of its transformation by refraction from deep waters during the quarter DEF, the average significant wave height is on the order of 2.2 m. Because, that is displayed in the dry season and the intertropical convergence zone is located more toward the south, which produces an intensification of

the trade winds. A large part of the wave energy is dissipated by the breakwater of the entrance of the bay where the address is chaotic due to breakdown; however, enter a height of 1.5 m that begins to spread and transformed along the bay. While, as the wave enters the Bay is directed toward the SW- SSW and W in the proposed area of construction of the pier, with significant heights of no more than 0.5 m.

Tides

The tides are periodic oscillations in sea level resulting from the gravitational attraction exerted by the Moon and the Sun on the Earth in rotation.

In the Panamanian coast Caribbean sector are mixed tides features tending to semi-daytime according to the criterion of Coutier F= 0.25 - 1.5.

A mixed semi-daytime tide; it is characterized by an inequality in the height of the successive high tides and low tides and their corresponding intervals of time without marked. In general, there are two tidal oscillations (high tides and low tides) daily, becoming, occasionally, in a diurnal oscillation.

In most cases, the tidal ranges between 20 and 30 cm and rarely exceed these values, without ever exceed the 50 cm. In accordance with (Kwiecinski, et al, 1994) the tides in the Caribbean are generally of low amplitude < 0.5m. You have a range of 27cm and the far end of the range is 0.46 m.

Your physical action on the dynamics of the marine environment and the coastline is reduced, that is to say, that these generate low velocities of currents, but as well as the swell is important in the self-regulation of the coastal area.

Analysis of the effect of the construction of the pier in the currents.

To this end, we used the results of the baseline and quantified the effect that can generate the spring proposed in the currents of the coastal profile from the Puerto Cristobal to Reef point, through the tidal prism.

PM (m3) = (m2) x amplitude (m) = T/2* (mouth)* V media

It sets out some criteria:

The occupation by the spring is less than 10% of the available surface area of the coastal profile in study. Which has an area of 360 ha.

PM = 360 has* 0.50 m = 1, 800.000 m3

T = 12.50 -24 hours, it is the period of the tide

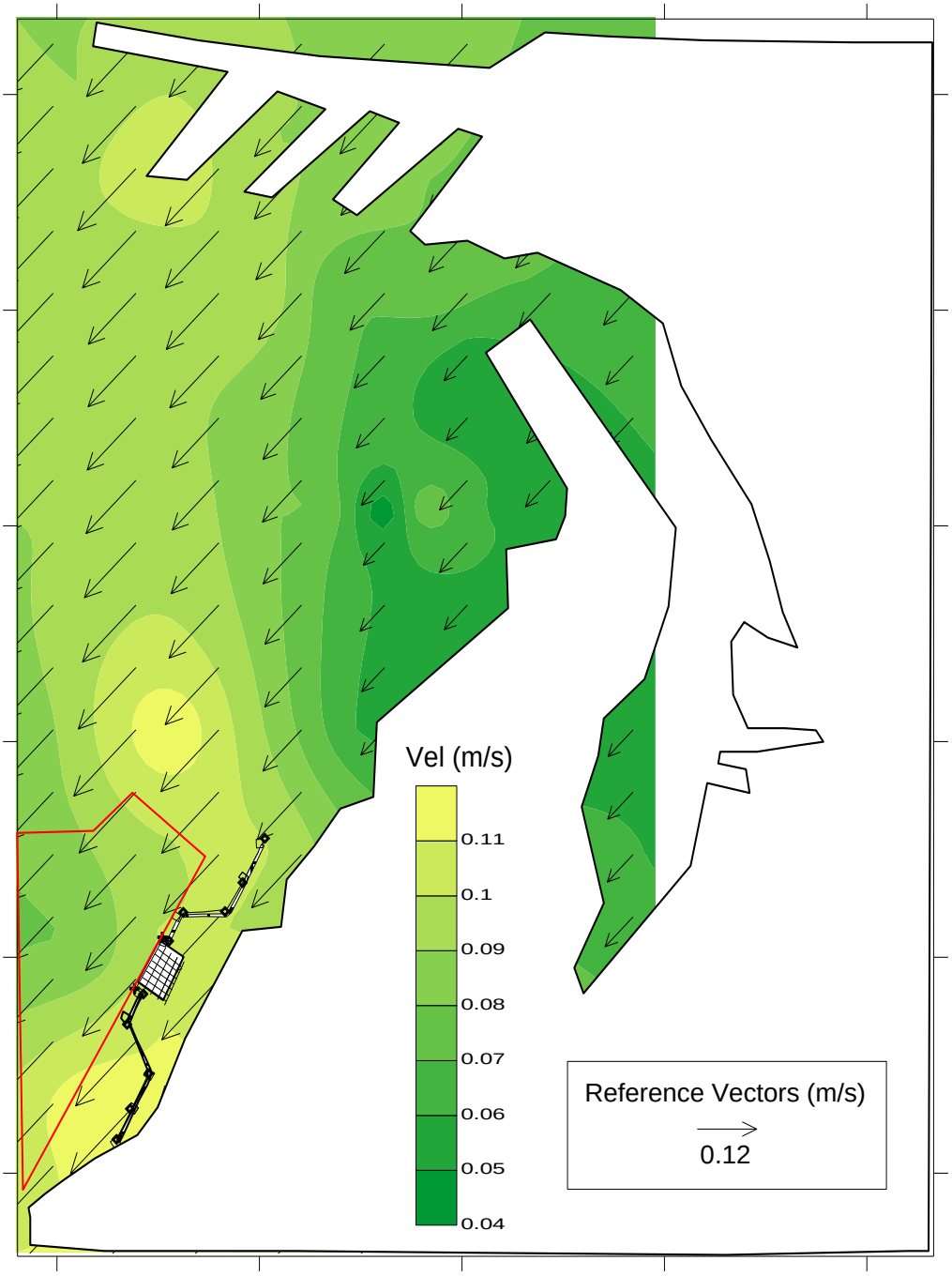
(Mouth), is the cross-sectional area of the area defined as "mouth" Artificial Island until the end of the stretch, which is estimated as the width of the mouth (3 km) by the average depth refers to the level of the sea (10m) = 30.000 m^2 .

V is the average value of the average speed of the mouth, which is obtained from the above equation, resulting in the order of 0.0018 m /s. (0.18 cm/s).

The affectation to the average speed of the tidal prism by the reduction of the surface, due to the spring, it is (0.0010 mm/s), i.e. a decrease negligible in terms of hydrodynamics. In figure 6.6.8. It can be seen that the direction and speed of the current does not suffer significant changes or alterations in quantitative terms from the point of view of the dynamics that occurs; so that the alternative of piles kneeling to 15 m in depth until the rock sound, it is environmentally appropriate, as well as its location away from the coast.

The proposed design does not interfere nor reduces the dynamics of the adjacent coast line.

6.6.8: currents modeled in the area of Construction and design of the spring.



In general terms, the results of the model show that this is a body of water of weak speeds to the western end and anchor in the area of Puerto Cristobal like the French Channel. While the area of construction of the pier presents with moderate slightly

speeds, between 0.09-0.12 m/s, with direction toward the SW. A significant heights with small waves, the age of 0.5m and an average speed of the tidal prism insignificant. On the other hand, the design of construction is compatible with the dynamics of the area.

6.6.2 Groundwater

There are no wells drilled within the project area. The activities to be developed will affect groundwater.

6.6.2. a. Characterization of aquifer

Does not apply.

6.7 Air Quality

The characteristics of the air quality are modified by the presence of sources of pollutants, of which in the project's area of influence, are distinguished only the corresponding to mobile sources of existing landfill and vehicles that circulate in the area and on the access roads.

6.7.1 Noise

Now the area is characterized with certain levels of noise on the grounds that the road limits the project is used by heavy equipment transports grain or other goods to the interior of the country.

However, the direct area of influence of the project will not be affected by noise, since there is no population and in the case of the animals either.

6.7.2 Smells

During the visit in the project area were perceived smells of the existing landfill.

In the area of influence are perceived smells that disturb the environment. Both in the construction phase as in the phase of operation does not provide for the existence of

nuisance odors, as due to the characteristics of the project do not constitute sources of bad smells.

6.8. Background information on the vulnerability to natural hazards in the area.

There is no evidence of natural hazards that might affect the project.

6.9. Identification of the sites prone to flooding.

There is no evidence of flood risks that might affect the project.

6.10. Identification of the sites prone to erosion and slippage.

There were no sites affected by soil erosion. The whole time that both activities of the project will be in the sea.

7. Description of the biological environment

7.1 Characteristics of the flora

Marine Flora

On the Caribbean coast of Panama are reported in the present 4 species of seagrass (Earle, 1972; Phillips & Menez, 1988; Marshall, 1994; Green & Short, 2003; Averza-Colamarco & Muñoz in prep.): *Thalassia testudfinum, Syringodium filiforme, Halodule wrightii* and *Halophila decipiens*.

Within the samples of sediments in the study area are not collected nor were any of the seagrass species reported for the Caribbean, Panama. It should be noted, however, that there may be areas with the conditions necessary for the establishment of these plant species, but it seems not to be found in this area in particular.

7.1.1 Characterization of plant, forest inventory (apply forestry techniques recognized by ANAM).

Does Not Apply

7.1.2 Inventory of exotic species, threatened, endemic and in danger of extinction

It is not observed.

There were no species in danger of extinction or endemic species whose populations may be affected by the project.

7.1.3 Map of vegetation cover and land use on a scale of 1:20.000

See Annex 3.

7.2 Characteristics of the Fauna

A. Methodology

The methodology employed for the realization of the study includes the collection of secondary information, field tours and laboratory work. A search was made of secondary information on the agencies reported for the development of the project. In order to achieve this objective we reviewed different documentation centers. These may include the Documentation Center of the Center of Ocean Sciences and Limnology, The Museum of Marine Biology and Limnology at the University of Panama, the Center for Documentation of the National Environmental Authority (ANAM), the Library of the Smithsonian Tropical Research Institute (STRI) and libraries of individual researchers.

The field trip was held on Saturday 30 November 2013. Sediment samples were taken using a dredge Eckman of 9x9x9 inches in stations located in the area of development of the project. The samples were placed in plastic bags ziploc bag" type "airtight container properly labeled for transport to the laboratory.

In the laboratory it was determined the composition of the granulometric fractions of the samples of sediments with a show of about 250 grams of material collected for then to be separated using a battery of metal sieves Mark Tyler in sequence 1.00mm 0.500mm 0.250mm; 0,125; and 0,063 mm. The fractions obtained in each of the screens were weighed in a precision digital scale (0.005g) and expressed as a percentage of the original sample.

The organic matter content was determined using the method of weight loss by ignition or incineration, taking approximately 200 grams of wet sediment, dried in an oven Lab Line Imperial II at 80º C for 48-72 hours until a constant weight. Around 15 grams of dry sample were incinerated at 550º C for 2 hours in an incinerator Thermolyne 1300 brand. The difference in weight of the samples were obtained using a precision balance (0,005 grams).

B. Description of the Coastal-Marine Area

The study area is located in the area of the Telfers Island in the province of Colon. The project, in its land area covers an area of approximately 40 hectares and includes a spring for receiving liquefied natural gas (LNG), designed to download methane tankers of 70,000 - 180,000 m ^{3} of capacity. You will have 800 meters long and may receive a capacity between 70 thousand and 180 thousand m ^{3}. The conditions for the use of the marine area, in general, are mainly related to maritime and port activities. Due to its location, you can receive input of fresh water product of the activities and proximity to the Panama Canal.

In general, all this area receives inputs of sediment or particles in suspension product of the passage of ships through the locks of Gatún and the consequent contribution of freshwater the Gatun Lake. Although it does not seem to be a determining factor in areas very close to these downloads of fresh water, there may be differences in the salinity gradients given the same operations of the Canal, in addition there may be an

interesting contribution of particles in suspension, which may in turn affect the composition of the benthos in the area.

Marine sediments

The bottom of the sea, also known as benthos, is the area that we found from the high tide line up to the funds of the regions of the ocean. It is in this area where we can find different types of agencies that generally do not have a great deal of mobility that allows them to move away from their surrounding environment. Here we find species that live set or buried.

Between these agencies and the substrate is establishes a relationship that depends on the nature of the latter; two categories namely: hard and soft substrates. The hard substrates are formed by rocks and structures built by man, while the soft substrates are elements that can be moved among themselves; that is to say with respect to the others who are around you. The reason why the different benthic organisms, settle in a particular habitat, will be determined in large measure by the various environmental factors that are present, so that the trophic adaptations of a specific species, reflect the performance and intensity of environmental factors of the environment that adapts and with which it interacts (Tena, 1996).

The macrobenthos soft funds is a key element in the balance of marine ecosystems; as it plays a very important role in the ecological processes such as nutrient cycling, metabolism of contaminants and the dispersion and the collection of particles (Torres, 2008).

The relationship between the distribution of macrobenthos loose funds and the characteristics of the sediment has been extensively studied (Peres and Picard, 1964; Gray, 1981; HOFRICHTER, 2004; Sousa et al. (2006). However, in coastal areas, the physical and chemical contaminants in sediments could exert a greater influence on the

macrobenthos that the characteristics of the sediments (lercari and Defeo, 2003; Lu, 2005; much *et al*, 2005).

The particle size distribution (grain size) of the soft substrates comprises fragments ranging from a centimeter up to 25 centimeters, gravel, sand, mud and clays (fragments of less than 1 micron). The organic matter found in littoral environments can have an origin in the eroded material or carried by the rivers and estuaries, that is to say, can come from the continents and in other cases it may be the product of primary production within the same aquatic ecosystem. According to Parsons and Seki (1970) cited by (1984), the organic matter that remains unchanged or is not degraded in the water column, is incorporated into the sediment where diagenesis processes. The biological processes that take place in the sediment are of greater magnitude than the chemical processes, such as for example the primary production, respiration and mineralization of the organic matter causing significant changes in the content of oxygen and pH.

General characterization of marine sediment in the Project Area

The sediment in the study area is characterized by the presence of clay silt particles as the dominant grain size. This feature can be based on the terrigenous contributions from the passage of water through the locks of the Panama Canal, the hydrodynamics of the currents, the effect of tides and waves. All of these factors provide the transport and deposition of particles in specific areas.

The percentages of organic matter are relatively low showing some concordance with what is presented in the literature according to the parameters established for the sediment reported. In general terms, we expect to find a lesser amount of organic matter as the particle size increases. In the area it can be seen that, in general, the organic matter is kept low indicating active biological processes.

Grain Size

The particle size fractions are dominant for all samples collected correspond to clay silt particles (grain size less than .063 mm), with values above 90 per cent. This shows a homogeneous condition within the area of study. This condition can be the product of terrigenous material inputs and the hydrodynamics of the area. Table 7.2.2-1, presents the particle size of the structure of sediment samples collected.

Table 7.2.2-1: Percentages of granulometric fractions obtained from sediment samples collected in the project area

Screen (E-1)	Weight thirst	Percentage	Cumulative
>1 mm	1.50	0.28	0.28
0.5-1	2.90	0.55	0.83
Ci 0.250-0.5	3.80	0.72	1.54
0.125-0.250	4.10	0.77	2.32
0.063-0.125	4.00	0.75	3.07
<0,063	514.90	**5.47**	100.00
Screen (E-2)	**Weight thirst**	**Percentage**	**Cumulative**
>1 mm	2.00	0.38	0.38
0.5-1	3.70	0.70	1.08
Ci 0.250-0.5	3.60	0.68	1.77
0.125-0.250	2.00	0.38	2.15
0.063-0.125	2.50	0.48	2.62
<0,063	512.20	**97.38**	100.00
Screen (E-3)	**Weight thirst**	**Percentage**	**Cumulative**
>1 mm	2.75	0.51	0.51
0.5-1	2.45	0.46	0.97
Ci 0.250-0.5	4.30	0.80	1.77
0.125-0.250	4.40	0.82	2.59
0.063-0.125	8.80	1.64	4.24
<0,063	513.30	**95.76**	100.00

Prepared by consultants of SERMUL, S.A.

Organic Matter

The Transformations of organic matter in the sediment surface in low sedimentation rate, such as the marine environment, can be substantial and this will lead to the incorporation of very little organic matter stable, whose slow decomposition does not use all the

oxygen combined. In such conditions the physical chemical properties of the medium and its composition remain little affected by long periods (Bordovskiy, 1965, cited by Lanza, 1984). The study area seems to behave according to what is established in the literature for this type of habitat.

The results of the analysis of organic matter for the samples collected in the project area indicate a low percentage of organic matter with 4.35%, 6.56% and 10.43% for the samples collected.

Table 7.2.2-2: Percentages of Organic Matter obtained in the samples collected in the area of expansion of the Spring.

	Sample No. 1	Sample No. 2	Sample No. 3
Crucible + shows incinerated	41.1	39.5	40.4
Crucible	30.1	28.1	30.1
Displays incinerated	11	11.4	10.3
Percentage of organic matter	**4.35**	**6.56**	**1043**

Prepared by consultants of SERMUL, S.A.

C. Marine Fauna

The outline presented to identify the marine fauna present in the area of development of the project, is divided into two categories: invertebrates and vertebrates. During the tour of observation was not found marine invertebrates in the sediment samples, however, has drawn up a list of possible species which can be found in or near the area. The vertebrates marine more susceptible to find are the fish, considering, of course, the area where the project will be developed.

The presentation of the marine fauna is made by grouping them into two large components, invertebrates and vertebrates. During the tour of observation and identification of marine species, marine invertebrates were the dominant agencies. However, there are different species of vertebrates (fish) associated to the ecosystems present.

Invertebrates

There were no bodies in sediment samples collected, perhaps by the spatial distribution of the agencies and the constant shipping in the area that can influence the composition or structure of some agencies. However this situation, there have been some invertebrates in areas near or around the area of development of the spring.

Table 8 .2.2-3: Agencies reported for the study area

Cutting Edge	Class	Order	Family	*Species*
Arthropoda	Malacostraca	Decapoda	Portunidae	*Arenaeus cribarius*
				Callinectes sp.
				Portunus sp.
Mollusca	Bivalvia	Arcoida	Arcidae	*Anadara sp.*
		Nuculoida	Nuculanidae	*Nuculana sp.*
		Veneroida	Tellinidae	*Tellina sp.*
Mollusca	Gastropoda		Columbellidae	*Anachis sp.*

Prepared by consultants of SERMUL, S.A.

The benthos or seabed has a huge variety of habitats compared with the pelagic environment, since it is a much more diverse benthic population, with a more varied. Within the benthos, diversity is greater in rocky (rich in encrusting and sessile organisms such as cnidarians, sponges, spirited, barnacles,…) because of the greater amount of existing micro-habitats in cracks and holes of the rocks, in counterpoint to the seagrass sediments that have populations less diverse.

Vertebrates

The information presented on the vertebrates was the product of the observations made during the field trip, information provided by fishermen and the captain of the boat, in addition to the analysis of the bibliographic information of agencies reported for the area.

Fish

According to Averza-Colamarco (personal communication), the studies that have been developed with respect to the seasonality of the fish in the coastal areas of the Caribbean coast of Panama, indicate to the present, that much of your presence is directly related with environmental variations. As an example, we can mention that the prevailing winds

in the North, which are given throughout the summer (December-April), tend to close the mouths of many estuaries, while maintaining the larval stages (which penetrate during November and December) within them, so that they can grow, until the rains come. In that time, they can get out of the estuary, in conjunction with a large amount of material export (which will serve as protection), toward the water affairs, product of the rivers to overflow, by the rains.

In Table 7.2.2-4 is a species of fish in a given moment can be found within the study area: the sabalo real, the great barracuda in the Caribbean, the picudilla, marlin, Liza and the sea bass are some of the species reported in areas close to the area of the development of the project, among others (Fischer 1978, Carpenter 2002b, 2002c; Averza-Colamarco 2001a, 2001b).

Table 7.2.2-4: Fish species reported for the study area.

Order	Family	*Species*	Common Name
Anguilliformes	Ophichthidae	*Scuticaris Bascanichthys*	Anguilla
Beloniformes	Belonidae	*Timucu Strongylura*	Needle
		Tylosurus crocodilus	Green pointer
Clupeiformes	Engraulidae	*Lamprotaenia anchovy*	Anchovy
		Lyolepis anchovy	Anchovy
Elopiformes	Elopidae	*Megalops atlanticus*	Sabalo real
Mugiliformes	Mugilidae	*Mugil curema*	Liza
Perciformes	Carangidae	*Caranx latus*	Horse Mackerel
		Caranx sp.	Horse Mackerel
		Trachinotus falcatus	Pompano
	Centropomidae	*Centropomus undecimalis*	Snook
	Gerreidae	*Eucinostomus gula*	Mojarra
		Eucinostomus jonesii	Mojarra
	Polynemidae	*Oligodon Polydactylus*	Babudo
	Sciaenidae	*Larimus breviceps*	Corvina
		Menticirrhus martinicensis	
		Umbrina choroid	Corvina
	Sphyraenidae	*Sphyraena barracuda*	Barracuda
		Sphyrna picudilla	Barracuda small

Prepared by consultants of SERMUL, S.A.

Fauna associated to the Environment Costero-Marino

During the tour of the collection of sediment samples and some seabirds were observed, especially the gull (*Larus atricilla*), however, it is common to find in coastal species such as the brown pelican (*Pelecanus occidentalis*) and the tijereta (*Fregata magnificens*). Marine mammals were observed in the area of development of the project or in the surrounding areas.

Inventory of species endemic, vulnerable, threatened or in Danger of Extinction

An organism can be considered threatened due to different causes such as hunting or irrational exploitation and lack of adaptation among others. A taxon is *Vulnerable* when the best available evidence indicates that it is facing a high risk of extinction in the wild. If the risk is very high is considered to be in danger of extinction according to the categories set out by the International Union for Conservation of Nature (IUCN). In another perspective, endemic species are those that are confined to a restricted natural area. Of the place, as indigenous but highly restricted in their dispersal.

Are not reported for the area of study species that are under the concepts of vulnerable, endemic or endangered according to the precepts set forth above.

7.2 Fragile Ecosystems

Fragile ecosystems are important systems, with unique features and resources. Include deserts, semi-arid lands, mountains, wetlands, small islands and certain coastal areas (www.gm-unccd.org). Fragile ecosystems are ecosystems highly susceptible to the risk of their natural populations, their diversity or the conditions of stability decrease dangerously or disappear by the introduction of exogenous factors or outside (www.parquesnacionales.gov.co).

Considering that part of the project area is located on the Caribbean coast of Panama, the type of fragile ecosystem that belongs to this region would be the coastal areas. The coastal zone is defined as "the maritime-land strip of variable width, where as a result of

the interaction of the earth, the sea and the atmosphere, through natural processes". In the same, develop exclusive forms of fragile ecosystems and their particular relations economic, social and cultural rights. Any action or natural or man-made phenomenon in one of these ecosystems has an impact on others, due to the interrelation that characterizes them.

I n the marine area, near the coast, there will be constructive activities for the new spring. It is necessary to consider that this is an industrial area that takes several decades dedicated to port activities by what is subject to disturbances in the coastal marine area.

7.3 Fragile Ecosystems

7.3.1 Representativeness of ecosystems

The representativeness is a fundamental objective used for assessing ecosystems and determine its importance for the conservation of biodiversity. The coastal marine ecosystem is the most representative in the area of development of the project even considering that in general this has been an area used for port activities for a long time.

8. DESCRIPTION OF THE SOCIO-ECONOMIC ENVIRONMENT

Through the lifting of field information, the updated information on the socio-economic characteristics of the communities under study and the existing structures.

In addition, general statistical data were obtained of the corregimiento and populated places of influence of the project.

8.1 Current land use in neighboring sites

The current use of adjoining sites of the project, corresponds to an area where there are already established companies with operations similar to the project such as Atlantic Pacific, S.A. (APSA) in the storage of fuel from the Atlantic Coast and the Panama Canal Authority (ACP), which are neighbors of the area selected in the Telfers Island.

8.2 Characteristics of the Population (Cultural and Educational Level)

Demographic Aspects

The demographic situation of the area of influence of the project is defined by various aspects that comprise in the first place, the population and its density, and secondly, their masculinity, birth and death rates to determine their population growth.

According to figures from the National Population and Housing Censuses in the year 2010, the province of Colón has a population of 241.728 inhabitants and a population density of 52.9 inhabitants per km ^{2}. By comparing these figures with those of 2000, when the total population of the province was of 204.208 inhabitants with a population density of 44.6 inhabitants/km ^{2}, there has been a growth of 37.520 inhabitants in 10 years.

Table 8.2-1 : population of the Province of Colón: Censuses of 2000 and 2010

Province District District	Surface (Km^2)	Population		Density (inhab./km ^{2})	
		2000	2010	2000	2010
Colon	4,575.5	204.208	241.728	44.6	52.9
Colon	1.179	206.553	174.059	147.5	175.1
Christopher	428.5	37.426	49.422	87.3	115.3

Source: Department of Census and Statistics of the Office of the Comptroller General of the Republic. Panama in figures, the year 2010 . Panama, 2013.

The increase in population in the corregimiento of Christopher is clearly noted in the above table, when comparing the figures of the census of 2000 with regard to the census

of 2010. Christopher shows the highest increase of the population, that in a period of 10 years, the population of this district increased by 22.248 inhabitants, that is to say, more than doubled its population of 1990.

With regard to the occupied dwellings, for 1990 the district of Columbus had 34.082 homes. For 2000, their number increased to 42.830, i.e. 8.748 new houses were built. Comparing the corregimiento of Christopher where the project will be implemented, it should be noted that Christopher has a higher number of houses. The following table illustrates the situation of the houses in the district of Colon and in the corregimiento under study.

8.2-2: Houses and people, according to the type of housing in the Corregimiento of Christopher

Type of housing	Housing	People	Average Inhabitants By Housing
Individual Housing	10.279	37.506	3.7
Permanent	9.989	36.431	3.7
Semi-permanent	242	872	3.6
Improvised	48	203	4.2
Departure	2.524	7.709	3.1
Room in house in the neighborhood	315	893	2.8
Collective housing	168	3.173	18.9
Local not intended for room	41	96	2.3
People without housing	-	1	-
Victims	-	6	-
Seals	-	32	-

Source: Department of Census and Statistics of the Office of the Comptroller General of the Republic. Preliminary figures of Population and Housing, the Year 2010 . Panama, 2013.

8.2.1. Demographics, social and economic.

Index of masculinity

According to the definition of the Comptroller General of the Republic (*Social Indicators 1994-98*), the Index of masculinity is referred to the relationship between the number of

men and women in a given population, which is expressed as the number of males per 100 females.

The province of Colon the masculinity index according to the census we reflected that in the district of Colon in the year 2000 there is a masculinity for every 100 women of 103.9 while in 2010 decreased by 101.3 having a difference of 2.6% .

The Corregimiento of Cristobal according to the census of 2000- 2010 reflects the index of masculinity for every 100 women in 2000 there was a 103.0, for 2010 has been increased to a 106.8 is 3.8%

At the level of district, Christopher presented for the year 2000, an increase has been observed in the male population, with a number of 312 men over the total number of women. In 2010 the increase was 1.626 men above the total number of women. This change could occur due to the increase in the number of industries and economic activities that took place in Columbus with the process of transfer of the Canal to Panama.

The following table provides more detail of the relationship of the male and female population of the area under study.

12 **8.2.1-1: Index of masculinity: 2000 and 2010**

District District	Population						Index of Masculinity	
	1990			2000				
	Total	Men	Women	Total	Men	Women	1990	2000
COLON	204.208	104.077	100.131	241.928	123.192	118.736	103.9	101.3
Christopher	37.426	18.990	18.436	49.422	25.524	23.898	103.0	106.8

Source: Department of Census and Statistics of the Office of the Comptroller General of the Republic. Preliminary figures of Population and Housing, the Year 2010 . Panama, 2013.

Rate of Growth

In the Province of Colon in the year 2006 reflected a 28.3% of births, between the years 2007 and 2008 noted a high rate of 70.3% and followed by the 2008-2010 with a birth rate of 59.2%.

The General Mortality according to the census of the 2000-2010 reflected to 22.5%, 67.9% and maternal child 3%. Which indicates to us that the growth has been normally to a 55.5%.

8.2.1- 2: Birth rates and mortality of the city of Columbus: 2006-2010

1 City of Colon	Birth Control (Births Alive)		2 Mortality						Natural growth [4]	
			General		Child Labor		Maternal [3]			
Year	Total	5 Rate	Total	5 Rate	Total	6 Rate	Total	6 Rate	Total	Rate
2006	1.051	28.3	14.358	4.4	971	14.8	55	0.8	1.061	15.0
2007	1.374	37.7	14.775	4.4	972	14.7	40	0.6	778	9.9
2008	1.163	32.6	15.115	4.5	877	12.8	41	0.6	680	6.9
2009	1.030	29.4	15.498	4.5	837	12.2	29	0.4	726	9.0
2010	1.024	29.8	16.542	4.7	910	13.4	41	0.6	973	14.7

Source: Department of Census and Statistics of the Office of the Comptroller General of the Republic, 2010 Panama in figures, 2006-2010 .
Panama, 2013.

Note:

1 It refers to the residency of the mother for the births and the late for the deaths.
2 Exclude foetal deaths.
3 Refers to deaths due to complications of pregnancy, childbirth and the puerperium.
4 Refers to the difference between birth and death rates.
5 By 1.000 inhabitants, based on the estimate of the population by 1 July of the respective year.
6 By 1.000 births.

These figures indicate a significant decline in the birth rate of the city of Colón, comparing the total number of births for the year 2006 to 2010 of 28.3 to 29.8 births. Fetal mortality, on the contrary, it has had a decrease of 15 to 14.

Finally, the natural growth per year reflected a significant increase, of individuals in 1996 to 2010.

Surface and density of population

The population of the district of Colon is very fragmented, the following table shows that there is a population density of 175.1 inhabitants/km ^{2}.

8.2.3: Surface and population density

Province District District	Surface (Km^2)	Population	Density (inhab./km^2)

		2000	2010	2000	2010
Colon	4,575.5	204.208	241.728	44.6	52.9
Colon	1.179	174.059	206.553	147.5	175.1
Christopher	428.5	37.426	49.422	87.3	115.3

Source: Department of Census and Statistics of the Office of the Comptroller General of the Republic. Panama in figures, the year 2010 . Panama, 2013.

8.2.2. Index of employment and other similar to provide relevant information on the quality of life of the affected communities.

Economic distribution of the population

The socio-economic situation of the population for this study (Table 8.2.2-1), has been determined by both the labor indicators such as the presence of basic public services with the district of Colon.

8.2.2-1: Indicators of Work

Province District District	Population				
	Total	Busy		Unoccupied	Not Economically Active
		In agricultural activities	In other sectors of the economy		
Colon	90.769	6.085		9.648	90.865
Colon	79.001	1.676		8.664	76.609
Christopher	18.467	150		2.244	18.073

Source: Department of Census and Statistics of the Office of the Comptroller General of the Republic. National Population and Housing Censuses, Year 2010 . Panama, 2013.

The indicators that appear in the table 8.2.2-1include the total population of the province of Colon, the population of the district of Colon and the population of the corregimiento of Cristobal where you will find the site of the proposed project.

The table presents three distinct groups of the population and whose definitions are given by the Comptroller General of the Republic:

1) **Population:** includes persons who:
   a) Have an occupation or paid work in money or in kind, during the reference period;
   b) Work on a regular basis in a business or company of a member of his own family, during 15 hours or more, even when you do not receive a wage or salary (Family Worker);
   c) Have a fixed occupation remunerated, but do not put any day of the reference period by a transient circumstance: due to an illness or accident; by conflict; for temporary interruption of work or due to bad weather or breakdowns in machinery; to be in use of your holiday, permit or license.

2) **Unemployed population:** includes people who:
   a) They had no occupation or job during the reference week of the survey, but had worked before and were looking for employment;
   b) Had worked or were looking for their first job in the reference week.
   c) They were not looking for a job in the reference week, but sought work three months prior to the survey;
   d) They were not looking for a job in the reference week, but have sought work before and are waiting for news;
   e) They were not looking for a job in the reference week, but claim that it is impossible to find a job.

3) **Population Not Economically Active**: includes housewives and other categories such as students, people who do not work and do not seek employment, retirees, pensioners, rentiers and withdrawn. Within the population not economically active noted the definition of "housewife", which it considers as such to the person who is exclusively dedicated to the care of your own home and do not receive retirement, pension, nor is RENTIER.

- Table 8.2.2-2 conclusions such as the following:

- The district of Colon holds the largest population of the province of Colon, equivalent to 85% of the total of the province.
- The Corregimiento of Cristobal where the project will be developed, has a greater amount of population.
- The secondary sector and the tertiary sector of the economy has the largest number of people employed in the province, in the district and in the two districts.
- The unemployed population is relatively low. The population not economically active, for its part, reported significant figures, although you must take into account the groups that compose it (see definition).

8.2.2-2: Social and Economic Indicators: Census 2010

Province and District	Average number of inhabitants per housing	Median age of the population	Average number of years approved (highest grade approved	Percentage of the population was illiterate (10 and over)	Percentage of unemployed (population 10 years and over)	Median monthly income of the population aged 10 years and over)	Median monthly income in the home
Colon	3.7	25	8.7	2.50	9.61	406.0	550.0
Colon	3.7	25	9.0	1.83	9.88	419.0	602.0

Source: Department of Census and Statistics of the Office of the Comptroller General of the Republic. National Population and Housing Censuses, Year 2010

With the purpose of obtaining a complete vision of the social and economic situation in which is the population of the province of Colon, specifically the district of

Colon, which is the responsibility of the present study, it is necessary to examine the indicators described above.

The indicators are defined by averages, percentages, and medium-sized enterprises of different aspects such as: inhabitants per housing, level of education, degree of illiteracy, levels of unemployed population and finally levels of monthly income. The above table you can obtain the following conclusions:

- The average number of inhabitants per housing unit, both in the province and in the district of Colon, is 3.7. This means that the average number of families that reside in the region do not live in overcrowded conditions.
- The median of the population is between 23 years for the province and 24 years for the district of Colon. This leads to the fact that this area of the Republic consists of a young population, with a supply of labor for investment projects.
- With regard to the average number of years of school approved, it is noted that the residents of the province have 8.7 years of schooling and the district have 9.0 years. These numbers mean that the population has completed at least six years of primary school and have come to the end between one and two years of basic cycle.
- In attention to the level of illiteracy, statistics indicate that in the province of Colon the percentage of illiterate people is 2.50, while the district the percentage falls to 1.83. Despite the fact that the percentages presented are low, you can still find the illiterate population in the region, which is a potential problem in relation to the obtaining jobs.
- In relation to the percentage of unemployed in the province, is 9.61% across the province, on the other hand, in the district the 9.88% is also unoccupied. To observe these percentages, it is concluded that the unemployment of Colon is not so high and that the increasing opening of labor markets in the region is able to absorb the labor potential.
- In response to the figures presented in the median monthly income of the population, is that the income of the province is of B/. 406.00 and B/. 419.00, meaning this, that incomes have increased in the past 10 years. However, we must not lose sight of the fact that this figure is only a medium, which means that certain sectors may be receiving income much higher or lower.
- The median monthly income in the home of the province is of B/. 550.00 and the district of B/.602.00. With these figures can be perceived that the income of the inhabitants of Colon is quite acceptable, but as specified in the previous paragraph,

these figures are presented as median and you cannot determine other income higher or lower.

For the support of the movement of the ports, there is a concession located in the Telfers Island (now connected to the mainland), operated by the Petroport, S.A., a local company supplier of liquefied gas, occupying an area of 10.4 hectares near the pier 16 at the port of Cristobal. Its facilities include 12 tanks with a total capacity of 1.44 million gallons of fuel. This fuel is intended to supply ships at Pier 16 and to export to other markets.

Are the areas of industrial use related to the operation of the Canal, specifically the Industrial Division of the Atlantic, located at Gatun. In addition, there is an area of light industry in the Processing Zone of Davis and in development plans another area next in Davis, who will be dedicated to the development of software and computer equipment.

The UABR, former of the Interoceanic Region Authority (ARI), is promoting projects of port development and maritime services in the area of Mindi and eco-tourism projects in the old Fort Sherman, west of the Panama Canal.

There is a concession to the company APSA - Gatun to operate oil terminals in the area of Mount Hope. The company also operates terminals oil tankers in the Pacific. At Gatun features 30 fuel storage tanks with a total capacity of 1, 207.000 barrels. The operation of receipt and dispatch of fuel is carried out in the spring 16 of the port of Cristobal.

In the tourism sector also runs major projects, the conversion of the premises of the School of the Americas in a tourist complex of 8.5 hectares, projected on the banks of the Gatun Lake and that counts with 306 rooms, marina and 17 units of time. The hotel is operated by the international chain Sol-Melia.

Within the economic activities that are developed in the district, include those associated with the Colon Free Zone (ZLC), with its commercial and industrial activity of storage,

processing and re-export, including textiles, leather, plastics technology, jewelry, and treatment of many raw materials.

As part of this Free Zone, are also important financial and banking activities, the activities of transport, both by their movement as for its territorial expression, as they occupy important areas of the Project.

The commercial activity of the Colon Free Zone, generates approximately 8.000 jobs and trade above the B/6.0 billion a year. The jobs in this area are characterized by medium and high wages.

The strong commercial movement generates, in turn, an important flow of commercial vehicles (trucks and trailers) and in the same way, an important flow of passengers to the Free Zone.

Land Transport Terminal, in the area of Bamboo Lane, generates an average of 1.750 operations of arrival and departure of buses and 60.500 passengers per day.

The port of Cristobal, which serves especially to the Free Zone and its areas of older tank located in the area of France Field, generates a moderate traffic volume, reaching a movement of containers in 1999, of 69.510 units, of which approximately 54% corresponded to landings and the remaining 46% of shipments. The port of Cristobal in conjunction with the Port of Balboa in the Pacific Ocean, are part of a concession operated by a new company, Panama Ports Company, S.A., a subsidiary of Hutchison Port Holding Ltd., which it expects to operate 900.000 TEU's per year.

The Port of Manzanillo, operated by Manzanillo International Terminal Panama, S.A. (MIT), which is in the process of expansion, has estimated a movement of containers for the year 2000 more than one million Teus. In 1999 the movement of containers totaled 536.040 units, including embarked and disembarked (Table D.4.9).

In addition, operating concessions for the ports of Coco Solo and Colon Container Terminal (CCT), operated by the shipping company Evergreen, which are expected to have an operation more than 2 million TEU's for the year 2002. The granting of CST is the largest and occupies an area of 24 hectares, and includes areas for transshipment, storage and handling of containers

Demographics, social and economic

The demographic, social and economic data are presented in tables shown previously, according to what is established by the Directorate for Statistics and Census of the Comptroller General of the Republic.

Demographic Characteristics

Under provincial, district, of the township and populated place

The province of Colon, according to figures from the 2010 census, it has a surface area of 4,575.5 km ^{2}, of which has a total estimated population of 241.728 inhabitants. Its density is estimated at 52.9 inhabitants per km ^{2}.

17 **8.2.3: Land Area, Population and Density of the population of the Republic according to province, district and township: Census 2010**

Province, District, Township	Area (Km ^{2})	Population	Density (inhabitants/km ^{2})
Colon	4,575.5		52.9
	1.179 241.728	206.553	175.1
Cristobal Colon	428,549.422		115.3

Source: Province of Panama and its statistics. 2010. The Comptroller General of the Republic

With regard to the number of women and men of the district was estimated in the 2000 of 118.736 123.192 men and women, for 2010 in the township was of 23.898 25.524 men and women. See Table 8.2.1-1.

8.2.3 Index of mortality and morbidity

Does not apply to EsIA Category II.

8.2.4 Employment Index

In the province of Colon, according to the 2010 Census, 65.2% of the population is actively engaged, and 38.1% are engaged in informal work and a 9.4% is unoccupied.

8.2.5 Equipment, services, infrastructure and economic activities

The province of Colon has services of entities and private companies the same offer services to the population for the well-being of the same, in addition have the infrastructure of all kinds within the Cristobal is noted houses of blocks, houses with the basis of block and the top of wood, the streets are paved and concrete. In terms of economic activities have the port system in Latin America, is located in the Atlantic entrance to the Panama Canal. This port system located in the Colon is formed by: Colon Container Terminal (owned by Evergreen), Manzanillo International Terminal (operated by Stevedoring Services of America), Panama Port Terminal (Administered by Hutchinson Whampoa) and Colon Port Terminal. Today the city has two new cruise ports, these are: Colon 6 2000 and the pier of the port of Cristobal.

Transport and communications

There is access to public transport and the selective so prevalent in the area.

Aqueducts

Currently, in the city of Colon and the surrounding area, including the community of Sabanitas, the management system of the wastewater consists basically in the sanitary sewer of the I.D.A.A.N. and primary systems of septic tanks and Imhoff.

The sanitation coverage in regard to the disposal of excreta and wastewater for the province of Colon is high, at the provincial level only 4.77 % of the dwellings are not a solution to health care. In the urban areas of the district of Colon, except in the Barrio Sur, which is the percentage of houses without facilities for sanitary disposal of excreta is below the average of the province, on the contrary in the rural districts the percentage of houses without coverage is relatively high.

The responsibility of the sanitation of the excreta and wastewater in urban areas is the responsibility of the I.D.A.A.N., sewer systems are built by the own I.D.A.A.N. or by private companies that develop projects of residential, commercial and industrial applications such as part of the projects, which are then transferred to the I.D.A.A.N. The rural areas are served by the Ministry of Health directly or through the bread on the table, see 8.2.5-1The percentage of houses without health services.

18 **8.2.5-1: sanitation coverage in the Province and Districts of Colon**

Province, District, Township	N° Homes	Without Health Service	%
Colon	63.502	1.686	2.7%
Colon	55.069	879	15.9%
Christopher	12.164	113	9.4%

Source: Department of Census and Statistics of the Office of the Comptroller General of the Nation. (Censuses of population and housing, 2010)

Currently, in the city of Colón and its surroundings, including the communities of Sabanitas, Cativa, Puerto Pilon, Villa Alondra and Cristobal, the management system of

the wastewater consists basically in the sanitary sewer system and primary treatment in septic tanks and percolation Imhoff and seagrass beds.

Electricity

In the community there is electricity that comes from the Company of distributor Elektra Noreste, S.A.

Religious centers

There is no header in the religious centers Catholic, evangelical and Protestant, Jehovah's Witnesses, and others.

The predominant productive activities

The predominant productive activity of the community is oriented toward commercial, industrial, transport, storage.

8.3 local perceptions about the project, work or activity (through the Citizen Participation Plan).

In this section, special emphasis is placed on the results obtained through the application of the technique of citizen participation. The consultant team, conducted a working visit to the site or project's area of influence. These were developed during the day 29 of November of 2013.

Detailed that the distribution of men and women in the population analyzed in Cristobal, is distributed between the 73.3% for men and 26.7% for women. (See Graph No. 1).

Figure 8.3-1

Table 19 8.3-1: 19 Years of residence of respondents

Years of residence	Quantity
3	3
5-9	5
13-15	4
20-26	3
Total	**15**

Prepared by Consultant. 2013

The residence time of the inhabitants in the Corregimiento of Cristobal is notorious due to the increase in the last 5-9 years of residence, which reflects the 5% of the inhabitants, determining between 13-15 years of residence with a 4%, then with a 3% between 3 years and 3% in the last of 20-26 years of residence in the district.

20 8.3-2: Main occupations of the inhabitants of the corregimiento of Cristobal

Main Occupations	Quantity
Seller	2
Secretariat	2
Adjutant General	1

Main Occupations	Quantity
Operator	1
Dispatcher	1
Soldering Iron	1
Work	1
Maintenance	1
Heavy Equipment	1
Retired	1
Dependent	1
Carrier	1
Dock worker	1
Total	15

Prepared by the consultant. 2013.

In terms of the occupations it is notable that the 2% of the population surveyed is dedicated to sales, followed by a 2%to jobs in offices and 11% in other miscellaneous activities.

Opinion of the Respondents:

The 100% of the inhabitants have expressed that if they are in accordance with the project, because it will provide jobs, will bring prosperity for the communities, will join the company's workforce and improve the economy of the population.

Observations of the pollster:

- The Community is distant to the project.
- The inhabitants are interested in the welfare of the community.
- The community is with optimism with respect to the project.
- Within the Community are leaders.
- The residents who have to take care of the environment.

8.4 Historical Sites, Archaeological and Cultural declared

Does not apply to this project.

8.5 Description of the Landscape

The landscape within the area of the project, corresponds to a landscape of the marine area of the Caribbean Sea.

9.0 IDENTIFICATION OF SPECIFIC ENVIRONMENTAL AND SOCIAL IMPACTS

This section makes an estimate of the extent of the environmental impacts likely to be caused by the actions of the selected project alternative. That is to say, a preliminary analysis of the cause/effect relationships, in order to anticipate the change that they can experience the environmental variables as a result of the project activities. To do this, it is necessary to carry out the identification of conditions or significant impacts, which is to find the relations or interactions between the elements of the project likely to generate environmental impacts and those elements or environmental factors susceptible of receiving these impacts, ignoring those that are considered to be of low magnitude or importance.

The environmental impacts to identify are structured by differentiating the phases of the project (implementation and exploitation) and environmental factors affected in the different media: the physical environment, which constitutes the physical support of the systems.

To identify the environmental impacts has been taken into account the base line and the background to the project's area of influence and the elements likely to be affected by the actions of the project.

Actions likely to generate environmental impacts:
From the description of the actions of the project and the environmental diagnosis of the study area can be identified a series of actions with the capacity or ability to generate some kind of impact on the environment in the area of location.

9.1 Analysis of the Environmental Situation (Baseline) in comparison with the expected environmental transformations.

For the present study shall be the identification and qualitative assessment of the potential impacts both positive and negative effects on the construction and operation phases of the project, on the different components of the environment, indicating under criteria also qualitative criteria and on the experience of those of greater or lesser significance.

The identification of the environmental impacts allows you to predict the environmental effects that will be given in each of the environmental components, which will result in a design of specific measures through its application, will minimize the negative environmental impacts or encourage the positive. The project shall comply with the requirements of forced withdrawal between batches with other projects.

9.2. Identification of specific environmental impacts, their character, degree of disturbance, environmental importance, risk of occurrence, extent of the area, duration and reversibility, among others.

The identification and assessment of impacts is developed through the comparative analysis of the current status of the elements of the components of the environment that have been described, characterized and analyzed with the potential alterations that will be presented on the attributes of those elements during the execution of the project, which is listed in the description of the project.

The methodological steps followed for the identification, prediction, analysis, assessment and organization of impacts are the following:

- Identification of potential sources of impact
- Identification and description of potential impacts and affected components, and
- Rating and Ranking of impacts.

The following table illustrates the foregoing:

9.2-1: Identification and description of Potential Impacts

Environmental component	Code	Potential Impact	Description
Oceanographic	OC-1	Resuspension of sediments and the reduction of the transparency	The pile driving actions that are the structural basis of the esplanade or spring, iran grounded to 15 m, other to 10 m. These whether kneeling by hydraulic pressure or by excavation have the capacity to generate resuspension of solids. Heavier sediments quickly settle, but the fine sediments, clays and silts remain in suspension and these are transported by the currents and swells covering large areas and generating turbidity, and increasing the concentration of suspended solids, surpassing the natural condition. The impact that physical decline will occur is the transparency of the water column, which will have a limited duration, especially since that will be basically fractions of Sand, silt and clay by the depth, severity and density settle out quickly, in the same place.
	OC-2	Alteration to the Hydrodynamics	This impact occurs when you alter or reduces the tidal prism. The morphological configuration of a system such as the Lemon Bay is the result of the interactions between factors such as the prism of tides, currents, and the prevailing direction of waves.
	OC-3	Affectation to the sedimentary dynamics	If you generate a significant impact to the hydrodynamics, the alteration in the sedimentary dynamics is likely.
Marine and Coastal Resources	RMC-1	Changes in the quality of the sea water	The constructive activities of the Castled and pile driving can affect the quality of the sea water to provide a greater amount of solids in suspension. These changes can affect both benthic and pelagic organisms in the project area.
	RMC-2	Damage to the bodies of the fund	The construction of the new pier leads to the establishment of a castled in the coastal area and installation of piles as part of the constructive activity. The Castled directly affects the bottom organisms because it eliminates the species that may be associated to it and who have limited mobility.

Environmental component	Code	Potential Impact	Description
	RMC-3	Changes in the benthic habitat	The sea is affected by the construction of the castled in the coastal zone, although these effects are much lower when installed piles. However, in one or another activity will occur in damages to habitat to a greater or lesser degree.
	RMC-4	Affectation to pelagic organisms	All marine activity carries some kind of affectation to pelagic organisms, so that you can assess the level of alteration to these agencies especially during the construction of the pier, pelagic organisms tend to be more affected than during the operation phase.
	RMC-5	Creation of new marine habitats	The construction of the castled, regardless of which affects the seabed, it also creates a new habitat that is usually conquered by invertebrate species associated with rocky coast.
Socio-economic	SE-1	Employment Generation	Will consist in the working places that can generate the activity of construction of the pier.
	SE-2	Risk of accidents	Would consist in the possibility of a worker suffering a certain damage resulting from their work activity. Are considered diseases, diseases or injuries with reason or on the occasion of the work.

The process of qualifying impacts is developed from the analysis of the following aspects:

- The characteristics and activities of the project,
- The elements identified in the area of influence of each environmental component,
- The potential sources of impact (actions associated with project activities) in each sector identified,
- Environmental protection measures referred to by the project itself.

The environmental rating of impacts (ISC) is a tool that facilitates the ranking of impacts, in order to prioritize and plan the implementation of mitigation measures, compensation or restoration.

The definition, range and rating for each of these parameters is presented below:

9.2-2: Criteria for Evaluation of impacts

Parameter	Definition	Range	Qualification
Ca= Character	Defines if the action is beneficial or positive (+) or negative (-), or neutral	Negative Positive Neutral	-1 +1 0
RO= Risk of occurrence	Describes the probability that the impact is likely to occur during the life of the project.	Very Likely Likely Unlikely	1 0.9 - 0.5 0.4 - 0.1
GP= degree of disturbance	Expresses the degree of intervention on the environmental component.	Important Regular Low	3 2 1
E= Extension	Defines the area affected by the impact, with respect to its spatial representation.	Wide (AII) Media (AID) The Project Area (Local)	3 2 1
Du= Duration	Evaluates the time period during which the impact will be felt or resentful.	Permanent (> 5 years) Media (5 years - 1 years) Short (<1 year)	3 2 1
Re= Reversibility	Evaluates the capacity that has the effect of be reversed naturally or through actions considered in the project.	Irreversible Partially reversible Reversible	3 2 1
IA = Environmental Importance	Defines the importance of the environmental element that can be affected, from the point of view of their quality	High Media Low	3 2 1

The CAI calculations for each environmental element, are made in arrays.

Identification of Environmental Impacts

Environmental Components

The elements of the environment potentially affected by the execution of works and actions of the project, are the following:

Physical natural environment

It is considered the Air, and the earth (ground)

Natural biotic environment

It has been considered in this EsIA the component of the fauna, the flora in the project area is low to zero practically.

Socio-economic and cultural environment

This component includes the population and employment (Welfare and Human Health)

The following describes those environmental impacts identified for each impact identified, a distinction is made between those generated during the construction phase with respect to those that will occur during the operation stage.

Oceanography

This section makes an estimate of the extent of the environmental impacts likely to be caused by the actions of the selected project alternative. That is to say, a preliminary analysis of the cause/effect relationships, in order to anticipate the change that they can experience the environmental variables as a result of the project activities. To do this, it is necessary to carry out the identification of conditions or significant impacts, which is to find the relations or interactions between the elements of the project likely to generate environmental impacts and those elements or environmental factors susceptible of receiving these impacts, ignoring those that are considered to be of low magnitude or importance.

The environmental impacts to identify are structured by differentiating the phases of the project (implementation and exploitation) and environmental factors affected in the different media: the physical environment, which constitutes the physical support of the systems.

To identify the environmental impacts has been taken into account the base line and the background to the project's area of influence and the elements likely to be affected by the actions of the project.

Actions likely to generate environmental impacts:

From the description of the actions of the project and the environmental diagnosis of the study area can be identified a series of actions with the capacity or ability to generate some kind of impact on the environment in the area of location.

The following describes those environmental impacts identified and f or each impact identified, a distinction is made between those generated during the construction phase with respect to those that will occur during the operation stage.

OC-1. Resuspension of sediments and the reduction of transparency.

Construction phase

During the construction phase, the actions of the project can be summed up in the pile driving actions that are the structural basis of the esplanade or spring.

The new dock will have an approximate length of 370 m, with a total of 125 piles, which will be grounded between 10 to 15m depth and his coronation will be at 4.0 m above the zero of the port. The main platform rests on a base of 45 piles and covers an area of 1500m ^{2} . While the 6 dukes of 8 tie are supported on stilts and have a surface area of 64 m ^{2}.

For the ramming each pile is individual and to a considerable depth; therefore its environmental rating of impact (ISC) is: -4.0, local and temporary impact, of a negative nature, affect a resource in low environmental importance.

Operation Phase.

The activity of maintenance and reinforcement to the structure, is of low environmental importance, its nature and environmental rating of impact (ISC) is equal to that of construction: -4.0.

OC-2. Alteration to the Hydrodynamics

Construction phase

The morphological configuration of a system such as the Limon Bay is the result of the interactions between factors such as the prism of tides, currents, and the prevailing direction of waves.

In accordance with the modeling carried out, the swell is kept at the site to a natural condition, with maximum heights of 0.5 m from the WNW in its transformation, the waves arrive at the coast, the wind currents do not have directional changes, nor of magnitude. While the tidal prism, product of the location of the structure, reduces the speed of the current is negligible in terms of hydrodynamics, which means that the design is highly compatible with the dynamic characteristics of the system. The environmental rating of impact (ISC) is: -2.0, the negative effects on the environmental elements is likely of low importance significant or not, in a local and temporary extension.

Operation Phase.

At this stage the conditions are maintained at the construction, with changes in the duration, the piles that are the basis of the structure or platform are part of the medium and is permanent; therefore, its environmental rating of impact (ISC) increases: -4.0; but their significance is of low importance. The design is essential in order not to generate any alterations to the dynamic system, the tidal prism is reduced significantly, while not the swell is governed by seasonal atmospheric factors.

OC-3 affectation to the sedimentary dynamics

Stage of Construction and Operation

Having no significant changes in the dynamic system, the sedimentary dynamics follows the same behavior during both phases that the hydrodynamics; that is to say, in conclusion, we note that the construction of the pier from the oceanographic point of view of the does not represent a significant impact; which allows to state that the proposed design of the site in the site is compatible with the dynamics of the same.

Important note:

The actions of the project can be summarized in the existence of a new berth and in the increase in the area of port esplanade. In addition, the exploitation of these new infrastructures.

Impacts to the biological element (Marine and Coastal Resources)

A. Changes in the quality of the sea water (RMC-1)

Construction phase

The effects on the quality of the sea water would be mainly related to the re suspension of particles that cause a decrease in the transparency of the water. In the same way, any other anthropogenic activity as potential leaks or accidental leakage of fuel or lubricants in the dock area from ships that dock in the port facilities. CAI= -16.8

Operation Phase.

During the operation stage, there is still the possibility of spills of hydrocarbons product of the boats that use the spring and the movement of the propellers vessels is associated with the re-suspension of sediment in shallow areas. The increase of suspended particles in the product of the operations of the spring can cause negative changes in the quality of the water although a temporary form. CAI= -2.4

B. Negative effects on benthic organisms. (RMC-2)

Construction phase

The work to be done for the construction of the new spring include the pile driving and the construction of a jetty, activities that directly affect benthic organisms. The placement of piles and the elimination of sediment in areas adjacent to the existing structures make the timely involvement is more than general. In the case of the jetty, the impact is more direct and permanent on the benthic organisms. The increase in the sedimentation product of the activities to be carried out in the construction stage (movement of boats, re-suspension of sediment) impacts the agencies present in this habitat type. CAI= -20.0

Operation Phase.

During the operation stage of the benthic species present may be affected primarily by the terrigenic natural runoff, pollution by hydrocarbons or movements of vessels in the spring (action of the propellers on the merits). CAI= -2.4

C. Changes in the morphology of the benthos (RMC-3)

Construction phase

The marine area of the spring project involves a castled and pile driving. The Castled completely changes the morphology of the benthos as it creates a structure not previously existed and removes or replaces a part of the seafloor. It should be noted that the use of stilts limits the extension of the affected areas in the places where they are placed. The expected changes are linked to the removal of the sediment at the bottom and the alterations that may suffer from organisms of the benthos to be amended in whole or in part the environment they inhabit. CAI= -20.0

Operation Phase.

During the operation stage of the spring, it is expected that there will be changes in the conditions in which the marine benthos, except that temporarily cause the propellers of

boats in relatively shallow areas at the time of berthing. However, these effects on the benthos should be minimal and temporary. CAI= -77.883

D. Affectation of pelagic organisms (RMC-4)

Construction phase

During the construction phase, some pelagic marine organisms may be affected due to the activity itself. These activities (construction) promote the displacement of pelagic marine organisms to places or areas with less disruption. In general, the agencies are looking for quieter areas, although sometimes they are able to adapt to the entry and exit of vessels in a particular area. CAI= 92.633

Operation Phase.

After the construction of the new pier, it is expected that some species of fish come closer to the new structure in search of refuge, although they might be receiving temporary effects with the berthing and departure of the boats. This makes it temporarily away from the area of activity, but generally return to the same site. CAI= 0.0

E. Creation of New Marine Habitats (RMC-5)

Construction phase

The location of the piles for the construction of the new pier and the castled, constitute additional structures in the area. During the construction phase and due to the activity of the work it is not expected that the piles or the castled are conquered by new species of organisms, however are potential habitats for species of marine organisms. CAI= 0.0

Operation Phase.

All structures that are built in marine waters, induce the attraction of new agencies, since such a structure, will be settled by organic particles that attract the perifitum, these in turn to zooplanctones which then attract invertebrates more evolved and finally to fish, consolidating the structure as a new habitat for marine species after some time. CAI= 30

9.2-3: Potential Sources of IMPACT CONSTRUCTION PHASE

	ACTIONS			
CONSTRUCTION WORKS	Movement of barges with rocks	Entry and exit of vessels	**Entry and exit of ships for construction processes**	**New permanent structures**
Excavation and foundation for the installation of piles		**X**		
Construction of castled	**X**		**X**	
Pile driving		**X**		
Employment Generation		**X**	**X**	
Risk of accidents		**X**	**X**	

Source: Prepared by the consultant, 2013.

9.2-4: Potential Sources of Impact Stage of Operation

	ACTIONS			
WORKS OF OPERATION	Movement of barges with rocks	Entry and exit of vessels	**Entry and exit of ships for construction processes**	**New permanent structures**
Docking of boats		**X**		
Spring And Castled			**X**	**X**
Employment Generation		**X**	**X**	
Risk of accidents		**X**	**X**	

Source: Preparation of the 2013 Consultant.

Identification and description of potential environmental impacts

From the analysis of the nature and magnitude of the actions of the project, identifies the impacts that could be developed during construction and operation.

Below are the impacts recognized, according to environmental components affected:

9.2-5: Identification and description of potential environmental impacts

Environmental component	Code	Potential Impact	Description
Oceanographic	OC-1	Resuspension of sediments and the reduction of transparency.	The pile driving actions that are the structural basis of the esplanade or spring. Iran grounded to 15 m, other to 10 m. These whether kneeling by hydraulic pressure or by excavation have the capacity to generate resuspension of solids. Heavier sediments quickly settle, but the fine sediments, clays and silts remain in suspension and these are transported by the currents and swells covering large areas and generating turbidity, and increasing the concentration of suspended solids, surpassing the natural condition. The impact that physical decline will occur is the transparency of the water column, which will have a limited duration, especially since that will be basically fractions of Sand, silt and clay by the depth, severity and density settle out quickly, in the same place.
	OC-2	Alteration to the Hydrodynamics	This impact occurs when you alter or reduces the tidal prism. The morphological configuration of a system such as the Lemon Bay is the result of the interactions between factors such as the prism of tides, currents, and the prevailing direction of waves.
	OC-3	Affectation to the sedimentary dynamics	If you generate a significant impact to the hydrodynamics, the alteration in the sedimentary dynamics is likely.
Marine and Coastal Resources	RMC-1	Changes in the quality of the sea water.	The constructive activities of the Castled and pile driving can affect the quality of the sea water to provide a greater amount of solids in suspension. These changes can affect both benthic and pelagic organisms in the project area.
	RMC-2	Damage to the bodies of the fund	The construction of the new pier leads to the establishment of a castled in the coastal area and installation of piles as part of the constructive activity. The Castled directly affects the bottom organisms because it eliminates the species that may be associated to it and who have limited mobility.

Environmental component	Code	Potential Impact	Description
	RMC-3	Changes in the benthic habitat.	The sea is affected by the construction of the castled in the coastal zone, although these effects are much lower when installed piles. However, in one or another activity will occur in damages to habitat to a greater or lesser degree.
	RMC-4	Affectation to pelagic organisms.	All marine activity carries some kind of affectation to pelagic organisms, so that you can assess the level of alteration to these agencies. Especially during the construction of the pier, pelagic organisms tend to be more affected than during the operation phase.
	RMC-5	Creation of new marine habitats	The construction of the castled, regardless of which affects the seabed, it also creates a new habitat that is usually conquered by invertebrate species associated with rocky coast.
Socio-economic	SE-1	Employment Generation	Will consist in the working places that can generate the activity of construction of the pier
	SE-2	Risk of accidents	Would consist in the possibility of a worker suffering a certain damage resulting from their work activity. Are considered diseases, diseases or injuries with reason or on the occasion of the work.

Source: Prepared by the consultant. 2013.

Assessment of Potential Environmental Impacts

With the objective of valuing and rank the environmental impacts identified, these are characterized considering quantitative parameters, set out in relative scales. These are combined in an index of Environmental Impact Rating (ISC), which allows for a comparative analysis of the potential alterations of the Project, assigning levels of importance to each of them. The evaluation will consider the potential sources of impact (works and actions of the project), its location, the potentially affected elements of each environmental component and the environmental protection measures contained in the draft.

The rating is performed by environmental component, characterizing the impacts that could potentially affect each of the elements identified in the area of influence.

Impacts on the Physical Environment

The impacts take place in two stages: construction and operation. Are of moderate negative significance and importance was not significant. The qualifications of the negative impacts range between -2.0 and -16.8 and are distributed mostly in the construction phase. In the operation stage, fluctuate between 0 and -4.0. Table 9.2-6 summarizes the scores obtained for the physical environment.

Table 26 9.2-6: Physical Environment 26: Rating of environmental impacts according to Item Affected

Code	Potential Impact	Affected element	Environmental Impact Rating (CAI)	
			Construction	Operation
OC-1	Resuspension of sediments and the reduction of the transparency	Decrease the transparency of the water column	-4.0	-4.0
OC-2	Alteration to the Hydrodynamics	Reducing the speed of the current	-2.0	-4.0
OC-3	Affectation to the sedimentary dynamics	Currents	-2.0	0.0
RMC-1	Changes in the quality of the sea water	The seafloor and turbidity of the water	-16.8	-2.4

Source: Prepared by the consultant. 2013.

Impacts on the Biological Environment

In the Biological Environment, the impacts also take place during both phases: construction and operation. Are of importance, moderate negative significance and importance was not significant.

The qualifications of the negative impacts range between -4.8 and -20.0 and are distributed in the construction phase. In the operation stage, fluctuate between 0 and -3.2. Table 9.2-7 summarizes the scores obtained for the biological environment.

Table 27 9.2-7 Biological Environment: 27 Rating of environmental impacts according to Item Affected

Code	Potential Impact	Affected element	Environmental Impact Rating (CAI)	
			Construction	Operation
RMC-2	Damage to the bodies of the fund	Marine Fauna (benthic)	-20.0	-2.4
RMC-3	Changes in the benthic habitat	Marine Fauna (benthos)	-20.0	-77.883
RMC-4	Affectation to pelagic organisms	Marine Fauna (pelagic organisms)	92.633	0.0
RMC-5	Creation of new marine habitats	Marine Habitat	0.0	30.0

Source: Prepared by the consultant. 2013

Impacts on the socio-economic environment

On this medium, there are basically two: one positive impacts in terms of the generation of jobs with ranges in construction of 36.0 and 27.0. The other is negative, and the risk of accidents with ranges in the construction of -10.5 and -12.0 in the operation. Table 9.2-8 summarizes the scores obtained for the socio-economic environment.

Table 28 9.2-8 28 Socio-Economic Environment: Rating of environmental impacts according to Item Affected

Code	Potential Impact	Affected element	Environmental Impact Rating (CAI)	
			Construction	Operation
SE-1	Generation of jobs	Population	36.0	27.0

Code	Potential Impact	Affected element	Environmental Impact Rating (CAI)	
	The Potential Impact Code		HIERARCHY	
IS-2	Risk of			minor accidents -10.5
-2	Risk of			minor accidents -12.0

Ranking of Impacts

Positive impacts

The components that would be altered positively are biological (new habitats) and socio-economic (population). Listed below are the positive impacts:

29 **9.2-9: Impacts of positive significance**

Code	Potential Impact	Hierarchy	
RMC-5	Creation of new marine habitats	30.0	Positive significance
SE-1	Generation of jobs	36.0	Positive significance

Source: Elaborac ion of the Consultant. December 2013

Note: ☐ Construction phase ☐ Operation Phase.

Negative Impacts

The negative impacts of the project, are hierarchical considering five categories of importance: very high, high, moderate, minor and not significant. With regard to the latter, resulted in a number of impacts with **non-significant negative importance rating** and one of **minor importance.**

With **moderate negative importance** are affected the seafloor, benthic habitat, and changes in the quality of the sea water; in the following tables, are shown in detail these impacts.

9.2-10: the Negative Impacts of Minor Importance

9.2-11: the Negative Impacts of moderate importance

Code	Potential Impact	Hierarchy	
RMC-1	Changes in the quality of the sea water	-16.8	Moderate negative significance
RMC-2	Damage to the bodies of the fund	-20.0	Moderate negative significance
RMC-3	Changes in the benthic habitat	-20.0	Moderate negative significance

Source: Prepared by the consultant. December 2013
Note: ■ Construction phase □ Operation Phase.

9.2-12: the Negative Impacts of importance not significant

Code	Potential Impact	Hierarchy	
OC-1	Resuspension of sediments and the reduction of the transparency	-4.0	A non-significant importance
OC-2	Alteration in the hydrodynamics	-2.0	A non-significant importance
OC-3	Affectation to the sedimentary dynamics	-2.0	A non-significant importance
RMC-4	Affectation to pelagic organisms	92.633	A non-significant importance
OC-1	Resuspension of sediments and the reduction of the transparency	-4.0	A non-significant importance
OC- 2	Alteration in the hydrodynamics	-2.0	A non-significant importance
RMC-1	Changes in the quality of the water of the sea	-2.4	A non-significant importance
RMC-2	Damage to the bodies of the fund	-2.4	A non-significant importance
RMC-3	Changes in the benthic habitat	-77.883	A non-significant importance

Source: Prepared by the consultant. December 2013
Note: ■ Construction phase □ Operation Phase.

9.3. Methodologies used in function of: (a) the nature of the action undertaken, (b) the environmental variables affected; and (c) the environmental characteristics of the area of influence involved.

The methodology consists of a set of procedures that will be used to identify and assess the potential environmental impacts generated by the project, so that it is possible to design measures to reduce negative impacts and enhance positive impacts.

This set of procedures follows a sequence of methodological steps which includes the identification of all the impacts that could be generated on the environmental elements in the areas of influence of the project.

The identification and assessment of impacts is developed through the comparative analysis of the current status of the elements of the components of the environment that have been described, characterized and analyzed with the potential alterations that will be presented on the attributes of those elements during the execution of the project, which is listed in the description of the project.

The range of the prediction and assessment of impacts is referred to the construction and operation phases of the project. The exclusion of the stages of data collection and abandonment is based on the following considerations:

- The stage of acquisition of information for the different components of the project, includes activities that correspond mainly to curriculum design, without involving actions on the environment.
- The project does not provide a closure or abandonment of their operations.

The methodological steps followed for the identification, prediction, analysis, assessment and organization of impacts are the following:

- Identification of potential sources of impact
- Identification and description of potential impacts and affected components, and
- Rating and Ranking of impacts.

Methodological Steps

Identification of potential sources of Impact

From the description of the project and the analysis, we identify, for each of the components of the project, the works and actions that can potentially generate some degree of environmental alteration. These actions, which constitute potential sources of impact, are common to several of the project works.

The definition of the works and their actions is presented in section C Description of Project.

Identification and description of the type of Potential Impacts

On the basis of the analysis of the works and actions of the project, its area of occurrence and the general characteristics, identifies the potential environmental impacts that may result from the construction and operation of the project.

The potential impacts are presented in a table that includes the environmental component affected, a code identifier, the name of the impact and its description.

Qualification Process Impacts

The process of qualifying impacts is developed from the analysis of the following aspects:

- The characteristics and activities of the project,
- The elements identified in the area of influence of each environmental component,
- The potential sources of impact (actions associated with project activities) in each sector identified,
- Environmental protection measures referred to by the project itself.

The environmental rating of impacts (ISC) is a tool that facilitates the ranking of impacts, in order to prioritize and plan the implementation of mitigation measures, compensation or restoration. The CAI is organized by environmental component, evaluating the impacts that could potentially affect each of the elements identified in the area of influence.

The CAI of an impact is determined on the basis of the allocation of quantitative parameters, set out in relative scales, to each of the environmental impacts.

The final assessment is obtained from an index that reflects multiple quantitative and qualitative characteristics of the impact.

The parameters that are defined are those identified by the environmental regulations in force, the weighted average for the CAI in the following way:

CAI = Ca x RO x (GP + E + Du + Re) x IA

Where:

Ca	Character
RO	Risk of Occurrence
GP	DEGREE OF DISTURBANCE
And	Extension
Du	Duration
Re	Reversibility
IA	Environmental Importance

The Environmental Impact Rating (ISC) is the numeric expression for each environmental impact, resulting from the interaction or combined action of factors that define the probability of occurrence of the impact, the extent to which could manifest itself (degree of disturbance, extension, duration and ability to be reversed) and the environmental value or importance of the element that is altered or impacted.

The importance of the Environmental Impact Rating is classified according to a scale of conceptual hierarchy, which is presented below:

Table 9.3-1: Ranking of 33 Impacts

Range of CAI	Hierarchy

Range of CAI		Hierarchy	
0	+36	Positive significance	The effects of the impact impact positively on the environmental elements of intervention by the Project
0	-5.3	A non-significant importance	The occurrence of adverse effects on the environmental elements is likely to affect a resource of low environmental importance, in an average length or local, in a period of short duration. The effects are generally reversible and of low intensity.
-5.4	-14.3	Minor	The occurrence of negative or positive effects on the environmental elements is likely or certain, affect a resource of low environmental importance, in an average length or local. The effects are generally reversible and average duration and low intensity.
-14.4	7.217	Moderate importance	The occurrence of negative or positive effects on the environmental elements is certain, affect a resource of medium to high environmental importance, in an average length or local. The effects are generally reversible, duration, and intensity.
-21.7	25.417	High Importance	The occurrence of negative or positive effects on the environmental elements is certain, affect a resource of medium to high environmental importance, in a wide range. The effects are generally reversible, permanent and important intensity duration.
-30.7	-36.0	Very high importance	The occurrence of negative or positive effects on the environmental elements is certain, affect a resource of high to very high environmental importance, in a wide range. The effects are generally irreversible, permanent duration and intensity.

9.4. Analysis of the social and economic impacts to the community produced by the project

The majority of the positive impacts of the project, product of the economic and social impact, practically all would be capitalized with the operation of the project, which is transformed into an inducer of jobs and activities. Similarly, construction activities also

act as generators of employment, which in turn contributes to the improvement of the quality of life.

For the operation of the project, the qualification of the positive impacts is 36.0, while the negative impacts of moderate importance vary with scores of 0.0 to -20.

On the negative, of greater weight affect the benthic habitat temporarily for the construction activity of the spring.

Positive impacts

The components that would be altered positively are the biological (creation of new marine habitats) and the socio-economic (population, generation of jobs).

10. Environmental Management Plan (EMP)

The present Environmental Management Plan (EMP) has been prepared taking as a reference the information obtained in the work of the technical team, the identification and assessment of environmental impacts and the measures suggested by the team for the environmental impacts identified, which allows you to run the PMA on the same criteria.

General Objective:

Provide a simple document that addresses the most important aspects to activate the response to problems that arise in the operations of the spring.

10.1. Description of mitigation measures specific to each environmental impact.

The objective of the program is the execution and implementation of the necessary measures to prevent and minimize the negative impacts that could produce the activities

of the construction of the pier. In addition to these activities can occur leakage of fuel or oil from trucks, boats or equipment.

Pile driving and berthing platform

The construction activity of the spring and its actions are susceptible to produce impacts according to the results of the impact rating, which in turn is based on the base line of the ocean component which indicates that the operations to be carried out do not generate significant impacts at any stage of the project, therefore, do not warrant corrective measures or mitigation. However, the environmental effects are summarized at the impact of the quality of the water.

Responsible: contractor of civil works in the sea

Summary of the activity

The new spring will have an approximate length of 370 m, with a total of 125 piles, which will focus on the rock between 10 to 15 m depth and his coronation will be at 4.0 m above the zero of the port. The main platform rests on a base of 45 piles and covers an area of 1500m ^{2} and is a concrete structure. While the 6 dukes of 8 tie are supported on stilts and have a surface area of 64 m ^{2}

Environmental Effects

As a result of this activity, have as their main purpose the following:

- Possible spills of oil or other type of hydraulic fluid in the machinery affected to this task, could generate water contamination
  Bay.
- The management of concrete near water can generate effects on the quality of the Same.

Mitigation Measures

Measures to control the quality of the sea water

During the construction phase of the Castled and pile driving could occur oil spills, dumping of waste, increased sedimentation or of particles in suspension. Some measures are proposed during the construction phase:

- Train staff on issues related to spills and accidents with substances such as fuel or lubricants.
- Keep the computer you are using, land and sea, in good condition in order to prevent leakage of fuel or lubricants.
- Remove any spilled fuel or oil immediately and arrange suitable sites.
- Do not pour sewage, solid waste or the sea.
- Implement measures of monitoring, surveillance and control such as visual inspections and periodic monitoring of the quality of sea water.

The activities of the spring during the operation stage, can generate impacts on the quality of the sea water, among them we find possible leaks that may have the boats that use, accidental spills during shipping or supply, discharge of waste and organic waste to the sea or discharges of wastewater from vessels or boats. To reduce the occurrence of effects on the quality of the sea water, we propose the following measures:

- Train staff on issues related to the management of spills and accidents with substances such as fuel or lubricants
- Remove any spilled fuel or oil, immediately and arrange suitable sites
- Do not discharge wastewater or solid waste to the sea.
- Perform periodic monitoring of water quality, in the area of the jetty

Measures to control sedimentation of the Seabed

The activities during the construction phase, Castled and pile driving can cause an increase in the generation of sediment, which have to be treated properly so that, ultimately, do not affect the seabed.

- Follow the set out proposed in the suggested measures to control the increased sedimentation during the construction phase of the project in the terrestrial zone.

During the operation phase, it is expected that there will be significant changes in the sedimentation of the seabed. The effect of the barges on the sedimentation of the seabed will be timely and temporary.

Measures to reduce their effects on the benthic species

During the construction phase, it is expected an increase in the sedimentation, product of the activity itself, which may affect species of benthos. In order to avoid this effect it is recommended:

- The use of piles for the construction of the structure (as set out in the project description). The stilts have the characteristic that are less invasive in marine environments, so its use for these structures is recommended.

During the operation stage of spring it is not expected that the benthic organisms are affected. However, it is advisable to follow a number of measures aimed at preventing the involvement of the same. It is advisable to take the following measures for the conservation of these agencies:

- Do not discharge wastewater or solid waste to the sea.

- To control the access of boats to shallow areas where the propellers may affect organisms living in the sediment at the bottom.

Measures to reduce the changes in the morphology of the benthos

It is expected, during the construction phase, the modification of the relief fund product mainly of the Castled and pile driving. While the castled has an alteration of the benthos not mitigable, the placement of piles is one of the less intrusive activities used in the construction of ports, given that the alterations to the fund are very punctual.

- The use of stilts (presented in the description of the project) is in itself an excellent measure to reduce changes in the morphology of the benthos.

In the stage of operation are not expected an alteration of the relief fund except that caused by natural sedimentation processes. Every time that there may be a risk of an increase in the sedimentation and therefore a change in the morphology of the benthos by unnatural causes, suggests the following:

- The measures presented to control the increase in sedimentation.
- To control the access of boats or boats to the shallower areas.

Measures to reduce the impact on the pelagic organisms

The pelagic organisms are affected by the construction of structures in the sea, so it is expected this same effect during the construction of the pier. This is a negative impact to make the agencies move to quieter areas. The impact of this action is negative, by making the pelagic organisms will move to other areas, more quiet, during the period of construction of the structures. Although these actions are of a temporary nature, it is recommended that:

- Implement the measures for the control of the deterioration of the quality of the marine waters (construction phase).
- Remove any spilled fuel or oil immediately and arrange suitable sites.
- Limit the number of vessels used during the process of construction of the pier.

During the operation phase, it is expected that the pelagic organisms return to the area and that it can be used as a refuge for some of them.

- Preventive maintenance tasks would be possible for the machinery that works in the driving of the piles.
- You must exercise extreme caution in the tasks of concreting over the water.
- You will not be able to wash tools or equipment next to the bay, having a specific area for this purpose.
- To implement the norms and conventions (MARPOL 73-78) to reduce marine pollution by oil spills
- Train staff on issues related to spills and accidents with substances such as fuel or lubricants;
- Dispose of absorbent oil and floating barriers to avoid short-term the dispersion of hydrocarbons in the water.
- Comply with what is established in the 35-2000 DGNTI-COPANIT Standard on Water, Liquid Effluent Discharge directly to bodies and bodies of surface water and groundwater, continental and maritime.
- Implement the plan for monitoring the quality of the marine water and sediment.
- Implement measures of monitoring, surveillance and control such as visual inspections and periodic monitoring of the water quality of both at the stage of construction and operation.

Management measures

The contractor must have a specific procedure for:

- Supply of fuel and oil change for the machines that will work in the construction of the piles and the docking platform.
- Procedure for checking the machinery, which includes in addition to the preventive maintenance the initial check of the hydraulic lines.
- Implement a money laundering working tools for concreting, along with the site of washing equipment.

The mitigation measures during the construction phase can be found in the table below:

10.1-1: Mitigation Measures, construction phase

Environmental component	Code	Potential Impact	Measures of Mitigation	Measures of compensation	Cost of the measure (B/.)
Oceanography	OC-1	Resuspension of sediments and the reduction of the transparency	Ongoing coordination of the activities of the construction of the pier	Not required	5,000.00
	OC-2	Alteration to the Hydrodynamics	Ongoing coordination of the activities of the construction of the pier	Not required	5,000.00
	OC-3	Affectation to the sedimentary dynamics	Follow the set out proposed in the suggested measures to control the increased sedimentation during the construction phase of the project in the terrestrial zone	Not required	5,000.00

Environmental component	Code	Potential Impact	Measures of Mitigation	Measures of compensation	Cost of the measure (B/.)
Marine and Coastal Resources	RMC-1	Changes in the quality of the sea water.	Implement the measures for the control of the deterioration of the quality of sea water, corresponding to the turbidity. Implementation of the Plan of monitoring of the quality of marine water and sediment.	Not required	7,000.00
	RMC-2	Damage to the bodies of the fund	Implement measures of monitoring, surveillance and control such as visual inspections and periodic monitoring of the quality of the water.	Not required	7,000.00
	RMC-3	Changes in the benthic habitat	Establish a program of permanent control of the use and maintenance of equipment, so that there is no leakage or loss of fuel or lubricants. The maintenance program for the team must ensure the operation of the equipment in an efficient manner and without any leaks.	Not required	7,000.00
	RMC-4	Affectation to pelagic organisms.	Implement the measures for the control of the deterioration of the quality of the marine waters (construction phase). Remove any spilled fuel or oil immediately and arrange suitable sites. Limit the number of vessels used during the process of construction of the pier.	Not required	5,000.00
	SE-2	Risk of accidents	Set the program of first aid and safety measures for workers	Not required	S/E

S/E: without setting the amounts, which will depend on the agreements with contractors as soldaria responsibility of both parties. 2013.

10.1-2: Mitigation Measures, Operation Phase.

Environmental component	Code	Potential Impact	Measures of Mitigation	Measures of compensation	Cost of the measure (B/.)

Environmental component	Code	Potential Impact	Measures of Mitigation	Measures of compensation	Cost of the measure (B/.)
Oceanography	OC-1	Resuspension of sediments and the reduction of transparency.	Ongoing coordination of the activities of the construction of the pier	Not required	5,000.00
	OC-2	Alteration to the Hydrodynamics	Ongoing coordination of the activities of the construction of the pier	Not required	5,000.00
	OC-3	Affectation to the sedimentary dynamics	N or expect significant changes in the sedimentation of the seabed	Not required	5,000.00
Marine and Coastal Resources	RMC-1	Changes in the quality of the sea water.	Implement the measures for the control of the deterioration of the quality of sea water, corresponding to the turbidity. Implementation of the Plan of monitoring of the quality of marine water and sediment.	Not required	7,000.00
	RMC-2	Damage to the bodies of the fund	Implement measures of monitoring, surveillance and control such as visual inspections and periodic monitoring of the quality of the water.	Not required	7,000.00

Environmental component	Code	Potential Impact	Measures of Mitigation	Measures of compensation	Cost of the measure (B/.)
	RMC-3	Changes in the benthic habitat	Establish a program of permanent control of the use and maintenance of equipment, so that there is no leakage or loss of fuel or lubricants. The maintenance program for the team must ensure the operation of the equipment in an efficient manner and without any leaks.	Not required	7,000.00
	RMC-4	Affectation to pelagic organisms	It is expected that the pelagic organisms return to the area and that it can be used as a refuge for some of them	Not required	5,000.00
	SE-2	Risk of accidents	Set the program of first aid and safety measures for workers	Not required	S/E

S/E: without setting the amounts, which will depend on the agreements with contractors as a liability of both parties. 2013

The construction of the project, includes the set of investments and activities that the Company undertakes to perform under the technical parameters, economic and environmental objectives laid down in the law, so that they could start the operation of the project.

The objectives to be achieved with the preparation of the WFP are:

- Check early and in a timely manner, the implications that construction activities, may have on the biophysical and socio-economic and cultural aspects of the site involved.
- Identify and establish the different components of the WFP to be included in the project.

Program for the Protection of the Marine Sediment

Measures for the control of changes in the topography of the Seabed

The alteration in the topography of the seabed is an inevitable occurrence of impact during the construction phase, which will take place at the construction site of the spring, so that the measures that are proposed for the same rather aim to reduce, as far as possible, the affectation of this medium. Considering the above, it is proposed that the implementation of the following measures:

- The bathymetric survey at the construction site of the spring.
- Conduct a study to identify the equilibrium bathymetric profiles, the slopes and heights appropriate to the site

It is recommended that, during the operation phase, implement, for the disposal site, the same measures outlined above for the construction phase.

Measures for the Control to the affectation of the marine sediment

The disturbance to the marine sediment is an unavoidable situation during the pile driving activities for the construction of the pier. However, once these activities have ceased, the ecosystem may return in the medium term, to its original natural conditions. However, to alleviate to some extent the damages produced, it is recommended that the implementation of the remedial measures, including for the control to the alteration of the quality of the marine water and sediment particle dispersion.

Listed below are the programs that make up the WFP:

- **Prevention and Mitigation of Environmental Effects**, on the basis of the criterion that it is always better to prevent and minimize the occurrence of environmental and social impacts, which mitigate them or correct them, have

worked a group of practical guidelines. Therefore: To prevent a balboa, mitigate 10 balboas and correct 100 balboas. As it is obvious that the idea is really prevent.

- **Contingencies**, intended to provide a quick and effective response to the possible presence of emergent events.
- **Occupational Health and Safety**, to determine the minimum quality standards required, which must be observed in the aspects related to: personal protective equipment; reports of accidents and injuries; transport of personnel, equipment and materials; emergency equipment and hygiene and first aid.
- **Environmental training**, through the identification of the minimum content required for employees to carry out specific construction tasks in a way that is compatible with the environment.
- **Community Relations** , whose basic components have been structured according to the following criteria:
  - In order, if possible, the participation of unskilled labor in the project,
- **Monitoring** , focused on obtaining analytical information for:
  - Check the implementation of the mitigation measures and the characteristics and efficiency of the same,
  - Track linked to the restoration of the areas audited and/or affected.

10.2. Responsible for the implementation of the measures.

The entity responsible for the implementation of the measures will be the promoter and the contractor because in the employment contract with the promoter of the project, include clauses related to such compliance.

10.3 Monitoring

During the execution of the project must undergo a series of environmental monitoring, with the objective to ensure that operations do not affect, in a meaningful way, to the environment, namely:

Environmental audits

In accordance with the applicable environmental regulations will be the tool to evaluate the implementation and effectiveness of the Environmental Management Plan, check the conformity with the applicable environmental regulations, and propose relevant recommendations, during the phases of construction, operation, maintenance.

The institutions involved in the audit are: National Environmental Authority (ANAM), Aquatic Resources Authority of Panama (ARAP), Ministry of Health (MINSA), Ministry of Housing and Land (MIVIOT), Administrative Unit of goods reversed (UABR) of the Ministry of Economy and Finance, Municipal Authorities, among others.

For the purposes of what is mentioned in the previous paragraph, the promoters of the project must designate a person, which will be responsible for carrying out the coordination with the above-mentioned institutions and environmental follow-up to the different actions during each of the stages of the project (in the first instance is delegated the responsibility to the project promoter). The designated as responsible for the monitoring, must assume the following activities:

- Ensure compliance with the appropriate environmental measures at the start of each stage.
- To comply, the schedule of monitoring to follow in order to comply with the rules and mitigation measures.
- Adequate monitoring of progress in each of the stages, ensuring compliance with the environmental measures for monitoring and mitigation.
- Reporting of monitoring activities and progress of the project's environmental regulatory institutions when requested, which must assess these reports.
- Coordinate the inspection visits and periodic evaluation of the progress of the work to verify whether it complies with the environmental requirements raised in this environmental study (WFP).
- In the event of problems inherent in environmental monitoring, you must inform your top to apply corrective measures immediately and prepare a detailed report of the case.

- Must be field forms (checklists) for environmental monitoring of the different stages of the work.
- Check that the corrective measures are met in accordance with the environmental requirements of the project and avoid the potential environmental problems that may arise.

10.3-1: Environmental Monitoring Program.

Plans and Programs	Construction phase	Responsible	Control	Annual cost B/
Evaluation of the impacts generated	Monthly	Company	ANAM	**3,000.00**
Implementation of Mitigation Measures Efficiency of the mitigation measures implemented, Corrective measures not provided for.	Fortnightly	Company	ANAM	**5,000.00**
Environmental Management Plan Verification of compliance through a checklist.	Monthly	Company	ANAM	**3,000.00**
Contingency Plan Report of emergencies and The corrective measures applied	Semi-annual	Company	ANAM	**5,000.00**
Environmental Education Plan Reports of results,	At the beginning of the project	Company	Company ANAM	**2,500.00**

10.3-2: Monitoring Plan. First Year

Type of Monitoring	Action	Implementation Schedule	Legal Criteria	Responsible	Annual Cost B/
Preventive measures of occupational safety and health	Review of compliance practices, preventive measures and hygiene in the workplace	Semi-annual	COPANIT DGNTI 44-2000, 45-2000	Company	**12,000.00**
Documentation	Create a file of all the monitored data	Semi-annual	Business	Company	**5,000.00**

Note: The implementation of mitigation measures, follow-up and monitoring, are set for the first year for the economic aspect, not like this, during the stages and phases of the project, during their implementation.

Control Mechanisms

The Environmental Monitoring Plan, will continue to follow-up mechanisms and monitoring that are detailed below.

For the project proposed by the Promoter, the mechanism of control of Follow-up and Monitoring Plan, it shall be the responsibility of the sectoral authorities, in the exercise of their legal powers, participate in the Environmental Impact Assessment Process, monitor the ongoing compliance with the rules and conditions on the basis of which was approved the study submitted to the Company.

The sectoral authorities and public services, for the activity to develop are the following: National Environmental Authority (ANAM) - Regional Administration of Colon, Ministry of Health (MINSA), Ministry of Labor, Ministry of Housing, Administrative Unit of goods reversed (UABR) of the Ministry of Economy and Finance, in the municipality of Colón, among others.

10.4 Implementation Schedule

According to what is established in the lease and investment, the implementation of the project will be carried out according to the schedule attached.

10.4-1: Schedule of Implementation

	Tasks	Duration Days	Home	End
1	**Government permits and authorizations**	90	01/10/2014	31/12/2014
2	**Financing**			
	2.1- Negotiation Conditions	120	01/01/2014	30/04/2014
	2.2- Signing Contracts	60	01/05/2014	30/06/2014
3	**Engineering**			
	3.1- Spring and Port Works	90	01/07/2014	30/09/2014

	Tasks	Duration Days	Home	End
4	**Supplies**			
	4.1- Spring and Port Works	150	01/03/2014	31/07/2014
5	**Construction and Mounts**			
	5.1- Spring and Port Works	270	01/06/2014	31/03/2015

10.5 Citizen Participation Plan

As stipulated in the Executive Decree No. 123 and No. 155, it is recommended to involve the community in regard to the Environmental Impact Studies, participation through interviews and/or surveys, where the population close to the area to express their opinion in relation to the project, its positive or negative impacts that it can generate the environment and the extent of nuisance to the community.

Within the first phase of the citizen participation plan, was carried out the collection of information in the communities near the project.

We proceeded to:

1. Visit the project area
2. Tour of the community
3. Application of a structured survey
4. Data collection and analysis of information.

10.5-1: Citizen Participation Plan

Actors	Resources	Actions	Responsible
Phase 1 - Community	Economic and social situation General opinion on the project	Tour of the community (social and economic) Implementation of	Developer / Consultant

Actors	Resources	Actions	Responsible
		surveys (public consultation)	
Phase 2 - Promoter	Material on the project	Disseminate information about the project to the community and to the authorities of the area, through meetings and delivery of information material on the project. Notices in the newspaper.	Developer / Consultant
Phase 3 - Community Promoter Authorities	All Social Actors	Take into account to the community for the work to be performed. Promote activities that are directed toward the care and preservation of the natural resources of the area.	Promoter/ community/ Authorities

10.6 Risk Prevention Plan

For the implementation of this chapter is part of the criterion to avoid and minimize the occurrence of environmental and socio-economic impacts, rather than mitigate them or correct them, however, as the implementation of the project involves the generation of impacts, present a series of preventive and mitigating measures.

Preventive measures are those that are to be incorporated into the project design and/or to be applied prior to the implementation of activities whose impacts are intended to prevent or minimize.

Objectives

• Establish actions to minimize impacts on the environment.

• Propose measures that can prevent and mitigate the impacts.

Activities

General measures of prevention and mitigation

- The maximum amplitude of the permanent right-of-way shall not exceed the specifications.

- When you need to run jobs in the vicinity to public facilities that could suffer damage as a result of its operations, it should begin such work to make the necessary arrangements to adequately protect such facilities (e.g. roads and public and private).

- After finishing the construction, all construction debris will be removed from the domain, and that path will be worked to restore it according to what is established in the program of rehabilitation of affected areas.

- The staff involved in the activities of construction shall be in accordance with the Training Plan of this document, the appropriate instruction on the basic aspects of industrial safety and environmental management such as waste management, appropriate location of the organic layer of the soil, industrial safety and community relations.

- All the work teams that are working on the line must have a first aid kit (coordinated by a nurse trained in each group), and equipment for control of small liquids if necessary.

- The transportation of equipment shall be carried out using the existing access, considering not cause inconvenience to the inhabitants of the sides of the roads and the possible deterioration of some of them.

Specific measures of prevention and mitigation

- To avoid contamination of the waters with the equipment used shall maintain an appropriate level of maintenance of the equipment.
- Will spill clean-up equipment accessible to the areas of operations.

Waste Management Plan (PMD).

It is expected that the Waste Management Program (PMD) to comply properly with the following legal environmental requirements:

Objectives

The goals and objectives of the Waste Management Plan for this project include:

- Comply with applicable environmental laws and regulations.
- Eliminate, prevent or minimize the environmental impacts associated with the generation of waste.
- Reduce the costs associated with waste management and the protection of the environment, instructing and encouraging the employees and workers, to reduce the generation of waste and to manage them efficiently in accordance with the alternatives chosen;

Activities

Under the Plan for Waste Management, the relevant authorities will follow up the waste flows and maintain an inventory of the waste generated by the operations of the spring as by the operation of tank sludge in the barracks of sediments.

The waste inventory will be used to quantify the waste predictable and help to focus on the areas in which they will be able to deploy efforts to minimize the amount of the same. Guayaquil Port Authority will review and amend these waste inventories on a monthly basis. If it is not possible to quantify the waste, will be acceptable to estimate them in function of the activity being evaluated, in this case the operations of the spring. The inventory should put emphasis on the areas that pose the greatest risk to the environment or that have the greatest potential for future risks.

The waste generated as a result of the contractor's activities that are covered in the contract the contractor, will be prepared in accordance with this WFP and other national rules that are applicable.

Classification

All the staff of the contractor shall have direct responsibility for the classification of Waste generated in their activity and each shall maintain appropriate conditions and the use of appropriate containers.

Waste Management

The following describes the basic measures that will be used for temporary storage and disposal of solid and liquid waste:

- A record shall be kept that includes quantities and management method used for all waste
- The waste containers will be coated or constructed of materials that are compatible with the stored waste.
- Roles of household and sanitary source will meet in closed plastic containers to avoid the presence of rodents, flies and other insects, for later disposal at the landfill site identified by the developer along with their contractors, notice or request for permission to the municipality of the province of Colon.

- The plastic containers will be stored in a basket and/or metal or plastic tank, for subsequent recycling; the same can be applied to the case of the remains of wood, before its reuse as stakes or final disposal for recycling in the first case and return to the soil as plant material in the second.
- No hydrocarbon liquid or solid waste containing hydrocarbons, it will be drained or discharged to the environment.

Waste minimization

Refers to the methods and technologies aimed at reducing or minimizing the amount of waste at its source of origin and/or the risk posed to humans and the environment.

The adequacy of specific strategies related to certain changes in operations, non-polluting, the timely maintenance of machinery and equipment and the cost of the disposal of excess items, are key factors for the correct application of this alternative.

The reduction in sources of waste generated is one of the most widely accepted alternatives. The activities to be followed will be:

- Waste Land with hydrocarbons; cans; kitchen scraps and junk food, batteries, paper, hoses, oils, lubricants are among those whose generation can be reduced by implementing appropriate technical staff training and use for each case.
- With this background, and in order to implement the policy of waste minimization, you must do the training to staff in accordance with the Training Plan.

10.7 Rescue Plan and relocation of Fauna and Flora

Does not apply to this project.

10.8 Environmental Education Plan

The Environmental Education Plan includes programs related to the components of the Environmental Management Plan. This plan is aimed at technicians and field personnel who will carry out the construction activities, action which will lead to the knowledge and compliance with company policies and operating procedures established.

Objectives

- Provide the knowledge and necessary training to staff in aspects related to the management of the safety procedures and the protection of the environment.
- Perform the strict monitoring of the training plan, to ensure that personnel are familiar and correctly applied environmental measures established within WFP.

The Plan is aimed at all personnel of the company and contractor working on the project. This plan will be directed in particular to the knowledge of the preventive and mitigating measures for the construction phase.

Activities

- The Industrial security personnel of the company, will be responsible for meeting the training needs of staff (and contractors) operating in the different sectors; that is to say, you should review the implementation of the Program of Training and should coordinate new dates for the implementation of talks.

- It will track the training received by staff this is carried out by means of a record that contains the information of the talks received. (Attendance Sheet).

- The assessment will be conducted weekly of the effectiveness of the training provided to staff by using the following criteria: analysis of non-conformities and quasi-accidents; Analysis of environmental incidents and personal accidents; and analysis of audits and inspections.

- Weekly presentations will be made to the contractor's representative to learn about the components of the Environmental Management Plan, the environmental and social impacts of the project together with mitigation and prevention measures.

- The general themes to be included during the implementation of the Training Plan will be the following:
    - Environmental and social impacts caused by the construction along with mitigation and prevention measures.
    - The Environmental Management Plan of the present study addressed to the staff of the company, contractor company. This program will be according to the functions that each employee plays within the project.
    - Procedures and drills for the Contingency Plan that will include: handling of equipment and material response.
    - Procedures and measures of occupational health and industrial safety (Plan of Industrial Safety and Occupational Health).
    - Procedures for the proper use and handling of personal protective equipment.
    - Procedures for the proper management of waste generated by the construction operations (Waste Management Plan).

10.9 Contingency Plan

The Contingency Plan for this EsIA, is an internal document that is used as a guide, for the implementation of the actions that require emergency cases as a product of the following:

- Accidental or unexpected risks

The Contingency Plan part of the development of various scenarios of incidents that might occur during the useful life of the facilities, plans to respond to these events, procedures for implementing these plans or guidelines for action, coordination, materials, equipment use, communication system, etc. is oriented to provide an immediate and effective response to any emergency situation that includes fuel spills or accidents, with the purpose of preventing impacts to human health, protect the community property in the area of influence and reduce the risks for the environment and the operation of the facilities.

Objective

- Provide the basic guidelines for rapid and effective response to any emergency situation that could be presented during the execution of the project.

Activities

The Contingency Plan is activated upon the occurrence of an incident or accident. The decrease in the risk of an incident, either in terms of the probability as its magnitude, is achieved by following the guidelines set out in the Waste Management and Occupational Health and Safety.

The Contingency Plan is designed to combat damage of different magnitude and will include the following groups and constituencies of support:

- Key Personnel: Personnel that by their specialty and training is prepared to counter the accident.
- Control group: Staff trained to respond to an emergency.
- Base of operations: Place where they go.
- Center of operation: Where the instructions for the base of operations are.
- Medical Assistance Center: adequate equipment and specialized personnel for Attend to the injured personnel.

Organization of the Contingency Plan

For the operation and running a structural box set, that will make maximum use of existing human resources, while maintaining the levels of authority and delegation, with the purpose of developing the Plan together.

Once the work is a listing that determines the specific roles, the media and calling plans, contacts with governmental and non-governmental organizations, hospitals, etc.

Procedure in the event of a contingency

The following specific action steps that should be followed in the event of a contingency. This procedure may be modified to incorporate additional information that is relevant.

- Set the location of the event, estimate the size and type of event.
- Carry out specific actions to control it.
- Notify the occurrence according to plan.
- Notify government authorities if necessary.
- Take corrective actions in the short and long term.
- Modify operations to prevent the recurrence potential of the incident.
- Documenting and investigating the incident in a form.

Contingency Procedure

Staff Training

All the staff that is part of the emergency response team or, should be adequately trained in the operation and maintenance of the equipment. Several sessions will be developed to inform, instruct and train staff on the content of the Contingency Plan and contingency response program to make sure that you have a full understanding of the specific actions of the same and of the way in which the contingency response team will be organized.

All the staff of construction of the project should be clear about the following criteria:

- **Prevention:** Protect the environment and to the staff, using the best prevention procedures that are technically and economically feasible.

- All operations shall be conducted in an orderly and careful manner to prevent any incident. All personnel will receive appropriate training as the Training Plan.
- **Detection:** the constant vigilance and adherence to prescribed procedures are essential not only to prevent incidents, but also to ensure that any effect to the system is detected immediately.
- **Initiation of response actions:** The person(s) to detect the incident shall give notice immediately to the responsible at the site, who, in turn ready to contingency response team.

INDUSTRIAL SAFETY AND OCCUPATIONAL HEALTH PROGRAM

The occupational safety and health is an issue of vital importance to the company, the same that must be shared by the different contractors and workers.

The activities of the project will take place observing and respecting the national and local regulations, as well as the policies and regulations that for the effect.

For the sponsor and its contractors to reach its goal of protecting the health and safety of workers shall communicate its policy to all employees and dependent workers and used as the basis for its program of health and safety.

The policy establishes the desire to achieve a work place free of accidents through compliance with all regulatory requirements, communicating the potential dangers to their employees and other interested parties, and providing training and equipment appropriate to their employees.

The policy also defines the expectations with respect to the responsible employees and contractors to protect the health and safety of their own and their peers.

Objective

Set the main guidelines for industrial safety and occupational health.

Activities

Occupational Health

- The Company will ensure that all of their workers and contractors are medically trained, with good health and medical conditions that may involve liability for the company. In this respect, it must be carried out before the start of the activities, a general physical examination to their employees and contracted staff or outsourced.

The staff will participate in an introduction program (induction) courses on health and safety, coordinated by staff responsible for the company. In these courses will be developed both issues of a general nature as particular, specifically related to the work to be performed. The topics will be the following:

- Risk Factors
- Safety equipment: objective and forms of use
- Personal hygiene in the facilities and access roads.
- Awareness about the environment and responsible behavior (treatment and disposal of waste, handling of fuels, etc.)
- First aid and familiarization with the procedures for the evacuation of the wounded
- Importance of the reporting and analysis of accidents and near-accidents (potential accidents)
- Environmental policies and standards of security.
- Workers' responsibilities with respect to the work clothes.

The courses may be supported with audiovisual materials (videos, charts, handouts) and with discussions and demonstrations. The basic training will be supplemented with additional courses in response to the deficiencies identified and/or to the responsibilities assigned to different people.

Industrial Safety

Conscious of the fact that the adequate treatment of safety aspects, as well as those relating to health and the environment, supported by adequate training of staff worker, the company will require the organization of safety meetings at different levels and frequencies:

- Initial meetings, induction for new staff. These meetings will be held prior to the start of the daily jobs and they are intended to provide the basic knowledge needed to begin the activity.
- Daily safety meetings. In the facilities will be developed daily safety meetings. Its aim is to maintain a high level of awareness on aspects relating to security. These meetings will consist in a session of about 10 minutes before the start of the work of that day. A specific topic should be chosen and discussed.

Meetings of the affirmation of knowledge acquired or on specific topics, according to responsibilities. The purpose of these meetings is to maintain and improve the knowledge of the workers on issues of security, and include the participation in the testing of training/emergency, first aid practices.

It will provide basic first aid training for the staff in such a way that the minor injuries can be treated in a timely manner, until they get adequate medical attention.

Contractors will be required to provide your staff with personal protective equipment such as:

- Pants for protection

- Helmets
- Face Shields
- Welding lenses with the appropriate lens
- Safety Boots
- Leather gloves
- Protectors
- Respirators
- Other Protective Equipment, such as breathing, gloves, safety harnesses or belts, clothing for the rain, should be used when the danger to which the worker is exposed to demand its use.
- The contractors shall provide the equipment and tools in good working condition.
- Contractors will be required to periodically run formal inspections of industrial safety to all construction equipment and associated equipment.

Type of Clothing: work clothing should be appropriate for the same. You must use a shirt and pants or coveralls.

Electrical equipment: The subcontractors who are working around electrical equipment must take all the necessary precautions to ensure that the computer is disconnected while you are working on or near the equipment.

Accident reports

As for the environmental incidents, you must have a system to inform or report accidents.

The reports should not only document the situations of real accidents, but also situations of "near misses". The reports must be completed within a maximum of 24 hours of the incident and shall be completed within the following 8 days, with the research and recommendations or corrective actions.

Any dangerous incidents involving personnel, equipment or facilities will be reported immediately and independently of the existence or not of personal injury or damage to the equipment.

Monthly or when merit will be presented a summary report of the compliance of safety standards and statistics on accidents. This will include statistics on cases which required medical treatment, lost-time incidents, the accumulated hours men work without any lost time incident, first aid cases, fatalities, near-accidents, audits and safety meetings.

10.10. Environmental Recovery Plan and abandonment.

The activities of installation, the Company must implement the following measures of environmental recovery post-construction:

- Remove any scrap of the area
- Removal of all solid waste
- Restoration of any fuel spill on the floor

There is a plan of abandonment for this project, however, before the operation of the project will be all project areas clean and free of debris that have been produced by the activities of the project.

10.11 Cost of Environmental Management.

In the tables 10.1-2, 10.1-1 and estimate the costs of mitigation measures for the construction and operation.

11. ECONOMIC ADJUSTMENT BY SOCIAL AND ENVIRONMENTAL EXTERNALITIES AND COST-BENEFIT ANALYSIS END

11.1 Monetary valuation of the environmental impact

The Monetary valuation

The monetary valuation indicates the value in terms of money, of the physical and psychic obtained in the evaluation of environmental agents, for it is part of the evaluation. The objective of the monetary valuation methods is to estimate the variations of well-being, product of the changing patterns in the environment. The assessment is a supplement to the assessment of environmental policy, since it is necessary to quantify the physical units into monetary units, for the purpose of homogenization and allowed to express calculations in economic terms. The quantification methodology must follow certain guidelines framed by ethical and moral principles.

These methods are applicable both to the valuation of environmental goods, and agents as to the effects that give rise to certain external agents producing impacts on the environment, being the main effect of pollution.

There is a classification according to the procedure in the valuation, separating the two valuation methodologies: direct methods and indirect methods, which are detailed below.

Direct methods of monetary valuation

Direct methods are those that obtain the monetary value, of the provisions to pay for an environmental good or of the request for compensation that asks for a man compared to the condition of their environment, by an external agent. It does not make comparisons with the physical drives, takes place in real markets and also within hypothetical markets, through simulations and direct surveys on those affected.

Certain features on the environmental impact, such as for example, the location of the phenomenon, the time duration, the amount of affected, etc. impeding the use of the market as a source of information, it is necessary to ask those involved (through

surveys and test) about the changes that they expect, or by the changes already produced (ex post), in regard to their well-being and quality of life.

Indirect methods of monetary valuation

Indirect methods employ a structure in which the relationship "dose effect", where it is determined physical values for pollution, and then proceed to make a monetary valuation. These methods allow you to estimate the value of the effects of the impacts on the health and comfort of the human being and the other living beings, as well as of the abiotic factors and the depreciation of the real material processed by the human being.

The main and most common indirect methods are explained below:

Method of prevention costs (avoided costs): This procedure is based on the assumption that the costs of prevention of environmental damage are borne by society as a whole, which provides an indicator of the value of the well-reviewed. The reliability of this method is affected because the costs of prevention of environmental damage depend on individual appraisals or social awareness of the society, negotiating capacity of budgetary issues, groups, etc.

Method on the basis of damage: it consists in the evaluation of the overall physical damages caused by a particular agent; the translation in monetary terms is carried out to assess the cost of losses in material resources (destruction of homes, destruction of facilities, furniture, and other material damage), using the market price. It also takes into account the costs produced by diseases (medicines, hospital treatment) and inability to work.

The present project's Environmental Impact Study indicates that the main impacts are related to the impairment of the quality of the air, and the affectation of soils. The economic value of the project's impact would be given by the costs incurred by the change in the quantity and quality of these resources on the welfare of the population

would be given by its relationship with the production of private goods that have a market.

Therefore, to determine a monetary value of the impact it is necessary, first, to know how affects the change in the quality of these natural resources to the community and to the ecology. However, such environmental impacts are often difficult to quantify since they do not have an expression in the markets given their characteristics of public goods, are not normally associated with goods or services that have prices recognizable. Added to this, there is an additional problem: when the environmental impacts, if they could be effectively quantified, the allocation of monetary values is usually complex, unreliable, and sensitive to economic conditions.

Despite these difficulties, the concept of 'environment' has become a strategic sense given the tendency to achieve sustainable development, which considers the internalization of the 'externalities', that is to say, the recognition that natural resources have a monetary value that must be borne by those who use or degrade. Therefore, in the field of economy of projects, there is a concern to consider other costs and benefits other than the traditional ones, as there are increasing demands of regulation, and the population affected by an investment project is concerned at the potential welfare losses, private property, and loss in the quality of the environment.

As a way of internalizing environmental and social costs of the project, proposes to the company allocate financial resources (as part of their operating costs) for monitoring changes in the quality and quantity of air, and soil (See Plan of monitoring, control and surveillance) conservation and restoration in the project environment, pending the availability of information to estimate the economic value of the environmental impacts of a more precise way using some proven methodologies.

Value of the environmental impact on the welfare of the population

The environment and natural resources they share three characteristics: generate externalities, public goods and common pool resources. Because of this the market system does not provide any information with respect to the value of the same, which leads to be considered free, to their use and consumption have no cost and consequently to the occurrence of the exploitation.

Economically value the environment means having an indicator of its importance in the well-being of society, to compare it with other components of the same. In reality, what we value is the change in the welfare for society resulting from changes in the availability and quality of the environment or natural resources, using as an indicator the money, which helps to weigh one thing with another as a common denominator. This problem may arise through the maximization of the utility function of the consumer, as follows:

Max U (A) s. a. I - P*A

Where, U is the utility of the individual, I is your income. A and P are vectors of goods and prices respectively.

To resolve this problem allows us to obtain the normal demand curves of the consumer goods (including the environmental good) and consequently the consumer surplus that is a monetary expression of the change in the welfare of the individual resulting from a change in the availability or quality of an environmental good or service.

Value of the Environmental Impact on the Ecosystem

The value of the project's impact on the ecosystem is more difficult to determine. Many people believe that there is something that you can call the intrinsic value of the resources, environmental goods and services. These have a value "in itself", values that do not match the values for the human species, values that are not manifested only because individuals have preferences for them. The economy of the environment currently accepts that both possibilities exist, and that the recovery involves two issues:

the value of the preferences of the public in favor or against the changes in the economic value environmental quality ( ), and the value that exists inherently to the "interior" of the resources of the environment (value).

The answer is that both values are legitimate, and both are relevant to the decision-making process. The decisions on the sole basis of economic values, does not adequately reflect the process that occurs in the real world; nor is appropriate when it is obvious that the agents involved in the development have multiple objectives, and not just the economic.

Economic Analysis of the Environmental Impacts of the Project

At the time of analyzing situations involving environmental problems, it is of the utmost importance the "Theory of externalities". An externality is defined as any action performed by an individual (producer or consumer) that influence the well-being of another. For example, the emission of pollutants into the air by an industry can lead to respiratory diseases for the population. Another aspect of an externality or environmental impact is the idea that the environmental risk can be transferred through time and space through the election of the strategies of reduction of pollution.

The environmental impacts caused by the development of projects, usually, can be positive and negative. The magnitude of these impacts depends on its participation in the Net Present Value and the effect of this on the internal rate of return of the project. For that reason, the concern of governments and international agencies for the issue of externalities, suggests the economic valuation of the environmental variable in the analysis of the environmental impact of the projects.

As we have already seen, the economic evaluation of environmental impacts generated by a project, it is not always easy to implement because of the complexity of the impacts generated or by the lack of information to assess such impacts, or by the same uncertainty about the true dimension of environmental changes caused by the project over time.

Once estimated the economic value of each environmental impact, the use of a conventional methodology as the Cost-Benefit Analysis, allows you to record and to estimate all the effects (including environmental costs in terms of costs and benefits) that can generate a particular project. This methodology allows to verify the degree of profitability of the project through the estimation of indicators such as net present value and internal rate of return. In this way, the project's financial analyst, you can evaluate the extent to which they can invest in protection of the environment without losing the return on investment.

11.2. Monetary valuation of the social externalities.

This point does not apply to the study of Environmental Impact Category II.

11.3. Calculations of the VAN.

This point does not apply to the study of Environmental Impact Category II.

12. TEAM OF PROFESSIONALS AND FUNCTIONS

12.1. Duly notarized signatures.

Below are the signatures of the participating professionals duly notarized (See Annex 11).

12.1.2. Record number of consultants

	Name of the Professional	No. of registration in ANAM	No. of cédula	Profession / Topics
	Dagmar M. Henriquez C.		6-57-2592	Coordinator of the EsIA Biologist

	Name of the Professional	No. of registration in ANAM	No. of cédula	Profession / Topics
1.		IAR-068-2000		Description of the project's area of influence. Identification of the environmental impacts PMA.
2.	Elio Alvarez	IAR-003-00	9-125-379	Consultant Partner Support Forest Engineer Executive Summary Project Description Identification of the environmental impacts PMA
3.	Diana Arauz	IAR-147-00	4-174-766	Consultant Partner Support Oceanologist Engineer Base Line, Identification of the environmental impacts PMA
5	Edgardo Muñoz	IRC-010-04	8-207-1518	Consultant Partner Support Biologist Base Line, Identification of the environmental impacts PMA
6.	Jamilet Pardo	Support Staff	8-720-2425	Consultant Partner Support Socio-economic component Identification of social impacts
7.	Raul Martinez	Support Staff	8-229-2175	Professional Geographer GIS Specialist Drafting and verification of Geographic coordinates

13. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

- Must be met with the methodology established in this EsIA and in accordance with the existing security standards that apply in coordination with the competent authorities.

- The proposed project will be developed, with a minimum of pollution, if you follow the recommended mitigation measures.

- The project has a great acceptance on the part of the community.

Recommendations

- It is mandatory compliance of proposed mitigation measures, as well as monitoring of the environmental variable. Once the EsIA is approved and issued the resolution on the part of the ANAM, the developer has the obligation to comply with the provisions of the same.

- It is the responsibility of the promoter of the project stay in coordination and communication with the ANAM and all institutions involved in the activity. Any change, event or situation is not expected to be present during the execution of the project, must be communicated immediately to the ANAM or to the institution competent in the subject.

- The project sponsor should be seen in the contract with the manufacturer(s) of the work all the responsibility that this (these) has (have) with respect to the implementation of the mitigation measures recommended in the study.

- A copy of the EsIA, once it is approved, it must remain in the project area at the disposal of the contractor, who is responsible for complying with the

commitments made in the environmental issue. Must be the base document of consultation before any action or situation that is present.

- It is important that the institutions involved with the monitoring of compliance with the recommended mitigation measures comply with their obligation and commitment.

- For all of the above raised and the content of the document submitted, we recommend the adoption of the EsIA, Category II submitted.

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15. Annexes

1. The company's general promoter of the project. Photocopy of the identity card/passport of the legal representative (notarized). Certificate of good standing and dignitary of the original company in the public registry. Writing of the Company.
2. Drawings of the land (polygonal) and design of the project
3. The regional project location maps, topographic and vegetation cover
4. LNG project: berth and unberthing Operational Simulation in spring LNG in Cristobal, version 2
5. LNG project: berth and unberthing operational simulation in Cristobal, Version 3 Final
6. Analysis of the hydrodynamic characteristics (currents, tides, waves; Site of the Spring Island Telfer, Province of Colon)
7. Lease and Investment, Resolutions Cabinet No. 2, of 19 January 2010.
8. Surveys
9. Lab Results
10. Photos of the project area
11. Notarized signatures of the Professionals