

December 2013

Environmental Impact Study Category II: "Update on EIA to Increase Capacity for the Combined Cycle Plant on 150 MW or more on PANAMÁ NG POWER, S.A. Project



Presented to:

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No. 1 General of the 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.

No. 2 drawings of the land (polygonal) of the project and regional localization of the project.

4243 Topographic Sheet IV IGNTG - MOP. Scale 1:000:50. Information on the type of plant to

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No.3 Lease and Investment, Resolutions Cabinet No. 2, of 19 January 2010.

No.4 Surveys

Nº5 Photos of the project area

2.0 EXECUTIVE SUMMARY

2.1 General Data Of The Company

The project sponsor is **PANAMA NG POWER, S.A.**, whose legal representative is **JOSÉ 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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D) web page:

E) SERMUL: Management Consultant, S.A., Registration:-013-2013-IRC DIEORA

2.2 Description of the project; area to develop, approximate budget.

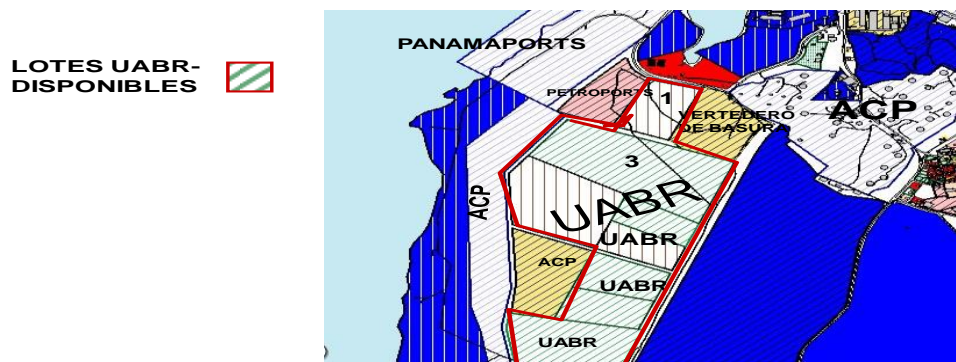
It is very important to note that in the EsIA presented provides for the expansion of the combined cycle approved by Resolution of the IA-172-11 of 9 March 2011, which was of 150 MW and is raised in this new EsIA 150 MW or more. To which we attach a copy of the resolution and the resolutions of the Cabinet No. 7 of 19 January 2010 and 43 of 13 April 2010, which amended the previous resolution and the Lease and investment with an option to purchase No. 239-2013.

Similarly, we would say that the Resolution. ASEP W-4364-Election of 30 March 2011 granted a provisional license for 270 MW, and another 550 MW expansion.

The project will consist in the installation of a thermal power plant to develop the activity of electricity generation through the construction, installation, operation, and maintenance of a Combined Cycle Thermal Power of 150MW or more using natural gas as a fuel, with their respective lines of connection to the transmission networks, processing equipment and fuel handling facilities, in order to produce and sell power and energy, and all that is contemplated and planned for the areas free of oil. The project is located with the following coordinates in UTM: 0620402 E and 1031911 N (polygon you04-01 of 7,033.33 hectares + 40 m²) and 1032359 0620112 E and N (Lot B of 7 hectares + 8, 911.85 m²).

For the design of the capacity of the Thermal power station and the commercial strategy of the business, takes into consideration the current conditions of the Panamanian Electricity Market, market projections for the short and medium term, and the projection of the demand in the area of the plant to supply the new industries that are installed.

The plant will be located in the Telfers Island area. In the first phase of the project, the plant will consist of two natural gas turbines. Be placed in concrete bases with walls that may contain spills by any accident. See annex No. 2



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.

The project will be developed in three stages. In the first stage will be built the Liquefied Natural Gas Terminal, in the second stage, will build the plant, which in turn will have two phases. In the first phase two turbines will be installed in the second phase, a boiler and turbine.

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

PHASES	DURATION	DESCRIPTION	AMOUNT (B/.)
PHASE 1	2 years counted from the expiration of the Phase 1	Thermal	400,000,000.00
		TOTAL	400,000,000.00

During the **implementation and operation**, is based on the provision of LNG as a fuel, sea water for the warming in the regasification process (previous data), diesel as an alternative fuel, electric power generation, water usually drinking water for human consumption of staff and demineralized water for generation turbines (emission control). The Liquefied Natural Gas (LNG) is difficult to ignite or explode and is non-toxic and non-corrosive. It is a colorless and odorless element that does not contaminate the soil or water, and that in the event of a spill evaporates and leaves no residue.

In the **construction phase** you will need the following staff (skilled and unskilled): a Structural Engineer, Civil Engineer with specialty in health care, Civil Engineer, Architect, Technicians, Electricians, Plumbers, Carpenters, Masons, Surveyor, painters, inspectors, Administrative Staff (Manager, secretary, etc.), Foreman, Electrician.

In the stage of **operation** will need to be skilled and qualified: Plant Manager, Supervisors, Operators, Assistant Operations, Mechanical Engineer, Electrical Engineer, Assistant Manager, cleaning staff, security, Drivers, General Manager, responsible for contracts, Chief of Finance, Personnel, Technical Support Engineer, Accountant, Assistant Accountant, Secretary, Clerk.

In the **construction phase**, the solid waste that this project is going to produce are diverse composition (vegetation and land) extracted from the land levelling, household waste generated in places of rest and feeding of workers (food, paper, cans, plastics and other), remains of construction materials, packaging equipment.

In the **operation stage of** the solid waste generated in the project are domestic type waste (paper, packaging, office materials, remains of food, plastics) from the administrative offices and generated by the employees, packaging, paper, packaging, pieces from the maintenance of the equipment installed in the Terminal and the thermoelectric plant, material type of sludge resulting from the demineralization of sea water, which will be used in the boilers for the operation of the steam turbines in the power plant.

In the **construction phase**, it is expected that the proposed project will generate the following liquid waste: spills of hydrocarbons and fuels from the equipment used in the construction of the infrastructure, 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.

In the **operation stage of** liquid wastes that are generated are: wastewater generated by the employees and from health services and sink installed in the administrative office of the terminal and in the Thermoelectric Power Plant.

In the **construction phase**, the gaseous waste that are generated are the gases of the combustion products of the operation of the equipment used, such as trucks, tractor, backhoe, shovel, etc. 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 will be the Thermoelectric Power Plant.

The emission of waste [atmósfera](#) and the processes [combustión](#) that occur in the thermal power plants have a significant impact on the environment. In any case, to a greater or lesser extent, all of them emitted to the atmosphere dióxido de carbono, CO₂. Depending on the fuel, and assuming a return of 40% on the primary energy consumed, a central térmica emits approximately:

Fuel	Emission of CO ₂ Kg/kWh
Natural Gas	0.44
Fuelóleo	0.71
Biomasa (Firewood, wood)	0.82
Coal	1.45

In the case of the project is to be developed, the natural gas plants can be operated with the so-called ciclo combinado, which enables higher yields (up to a little over 50%), it would still take the plants that work with this fuel less polluting. The combined cycle natural gas are much cheaper (reaching the 50%) than a conventional thermoelectric, increasing the thermal energy generated (and hence profits) with the same amount of fuel, and lowering emissions cited above in a 120%, 0.35 kg of CO₂ per kWh produced. It will be more efficient with emissions of 40% less NO_x. See Annex N° 2

The gaseous emissions in a center that uses natural gas as a fuel in the process of power generation have the following composition:

Load Condition		BASE	BASE	BASE
NOx	ppmvd @ 15% O2	42.	42.	42.
CO	ppmvd	10.	10.	10.
UHC	ppmww	7.	7.	7.

EXHAUST ANALYSIS % VOL.

Argon		0.86	0.88	0.85
Nitrogen		72.05	72.66	70.73
Oxygen		12.86	12.94	12.63
Carbon Dioxide		3.27	3.31	3.20
Water		10.97	10.22	12.59

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

The area where the Terminal and the Thermal 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.

The estimated investment of the work is of B/. 400.000, 000,000.00.

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

The stratigraphy of the area of the development of the project, at the top, is characterized by non-consolidated sediments, filled with sand and corals. Underlying in addition, formations

of lacustrine sediments¹² (sediments Holocenos), made up mainly of silty sand, silt and organic clays.

The soil has a use of 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. We also develop activities of the authority of the Panama Canal and Panama Ports Company.

The area is made up of **LOT B**, of 78,911.85 m², with 30106-118990 Approved Level, and the **polygon you04-01** of 400,000.00 m², with 30106-118989 Approved Level, which together have a area of 478,911.85 m², which form part of the Estate 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).

The agrologica 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 elevations of the terrain, where the project is located, 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.

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

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

(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.

Now the area is characterized with certain levels of noise by reason that the path that limits the field is used by heavy equipment transports grain or other goods to the interior of the country.

The project will be implemented in stages and levels of noise generated will vary depending on the activities to be carried out in each one. The phase that will generate greater amount of noise will be the movement of land due to the machinery used.

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

According to the "Map of areas of life of Panama", the project is located in an area of tropical moist forest (BH-T). In the area of the project has already been completed the removal of part of the vegetation according to the referred to in resolution No. IA-172-11 in which there were guidelines to deal with the permission of felling and removal of vegetation by the ecological compensation to be dealt with by the project sponsor. ³

Therefore, the vegetation present in the project area is low, because the site has been acondicionandose for the development of the different stages of the project.

In the area of influence of the project, are not representative ecosystems of significant ecological importance.

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

³ ([Http://www.anam.gob.pa](http://www.anam.gob.pa))

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 consists of the construction of a liquefied natural gas terminal and a thermoelectric power plant. The area where the aim is to develop the project is a designated area for industrial use, where there is already operating a liquefied natural gas terminal.

The construction of the project will 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 in the operation stage by gaseous emissions of thermoelectric power plant. You can register vibrations and noise from the operation of turbines and generators of electric energy and for the operation of the gold teams involved in the activities.

2.5 Short ofscricpion 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, changes in the division and possession of the property, 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.

Potential Impact	Description
Increased levels of emission of particulate material	Is produced by the generation or increase of particulate emissions, the effect of the movements of land, loading and transport of materials, movement of equipment in the work, fixed machinery operation and traffic. You can directly affect the quality of the air in the immediate area of influence of the project.
Increased levels of emission of combustion gases	Corresponds to an increase in greenhouse gas emissions resulting from the combustion of fuels (mainly carbon monoxide, oxides of nitrogen, sulfur dioxide and organic gases), due to the movement and movement of machinery, vehicles and aircraft. You can directly alter the quality of the air in the direct area of influence of the project.
Alteration of the geological material Formations (Gatun and Aguadulce)	Is the scarification or destruction of formations, product of the movement of earth, rocks for the obtaining of stone material for fills and achieve grade level.
Modification of the topography or shape of the highlight current	This impact is originating with the actions of movement of earth and rock, leveling and compaction of the soil, which involve the court of wavy and fill areas of sites with depressions, to obtain a flat topography for the construction of the civil works of the project.
Soil Erosion	This impact would be produced by the elimination of vegetation cover and land movement, that exposes the soil to the effects of the rain water runoff, intensified by the existence of slopes of fillers is not protected, with slopes or inclines.
Soil loss	It consists in the removal and total or partial burial of the soil horizons product of the occupation of the land for the construction of the project works.
Alteration of the physical properties of the soil	This is the physical modification of the soil, in terms of their apparent density, permeability and structure by the compaction.
Alteration of the quality of soils	Would take place by the accidental contamination or bad practices, by the dumping of substances or solid and liquid wastes during the construction and operation of the project works.
Alteration of the quality of the waters	Would correspond to a variation of physical-chemical concentrations that have the waters with respect to the base line, due to the movement of earth and rock, loading and transport of materials, movement and operation of equipment, machinery and vehicles, waste management, use and management of hazardous substances or contaminants. These actions can produce the contribution of pollutants by inappropriate practices or accidental spills.

Potential Impact	Description
Risk of damage to the fauna, by the levels of noise generated	This impact would be submitted when the elements of the fauna present in the project areas and its surroundings, are affected in their habits due to an increase in the levels, frequencies and durations of noise. This can affect the habits, migration, reproductive rights, among others.
Risk of loss of habitat for wildlife	Triggered by the disappearance and subsequent replacement of a habitat for wildlife, due to the removal of the vegetation cover, leveling and compaction of the soil, paving, stabilization and revegetation.
Generation of jobs	The implementation and operation of the Project works will require a direct way the hiring of labor and indirectly induced employment, due to the multiplier effect of economic activities that would lead to a fundamentally strong modification of the labor market in the district of Columbus.
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.
Development and intensification of economic activities	The creation of a thermal power plant and the distribution and marketing of natural gas, would result in the creation of externalities that encourage investment and multiplication of complementary activities or support, as well as other similar or specialized, aimed at different markets.
Changes in the division and possession of the property	The project considers the use of the plots of land in concession to develop the project. In this way, the state-owned land are delivered in concession to a private for the installation and development of economic activities
Increase in the value of the land	The establishment of the project involves the establishment of basic services that require industries to be able to carry out its work (sewers, roads, electricity, telephone, etc.), along with the area of value added activities. Each of these items adds value to the ground, since there would be a demand for the areas that they plan to develop by third parties for commercial-industrial uses.
Involvement of the system of collection and disposal of solid waste, increase in his generation	Would be generated by the increase in demand and coverage of basic services for collection and disposal of waste and construction, affecting their availability and quality.

Potential Impact	Description
Deterioration of the road network	Would be produced by the movement of trucks and heavy equipment on the tracks, product of the transport of materials and other products, without complying with the standards that can support each way. This impact can cause indirect effects such as damage to vehicles, vehicle maintenance costs and increased costs in maintenance of the roads by the competent institution.
Uses compatible with the territorial planning	Within the areas that can intervene the project, there are zoning with land uses that correspond to the activities that the project will develop.

Source: Prepared by the consultant. 2013

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:

- Require contractors machinery in good mechanical condition. Check that the machines are in good state of maintenance during the work to be done in the project.
- The equipment and machines will receive regular maintenance and will remain in good working order to avoid and prevent excessive emissions and noise.
- Silencers or other noise control mechanisms will be used and maintained in good condition.
- The trucks traveling on public roads will be equipped with a canvas cover to prevent dust and the fall of materials during transport.
- These trucks must be in perfect operating condition to ensure public and occupational health and safety during operations.
- With regard to the emissions into the atmosphere of the different machinery to be used, must be permanent maintenance (fortnightly) in order to avoid pollution.
- All equipment must comply with the established noise limits for residential areas. Noise monitoring will be carried out with the aim of determining remedies and enforcement of environmental standards. In the case of detected levels of noise

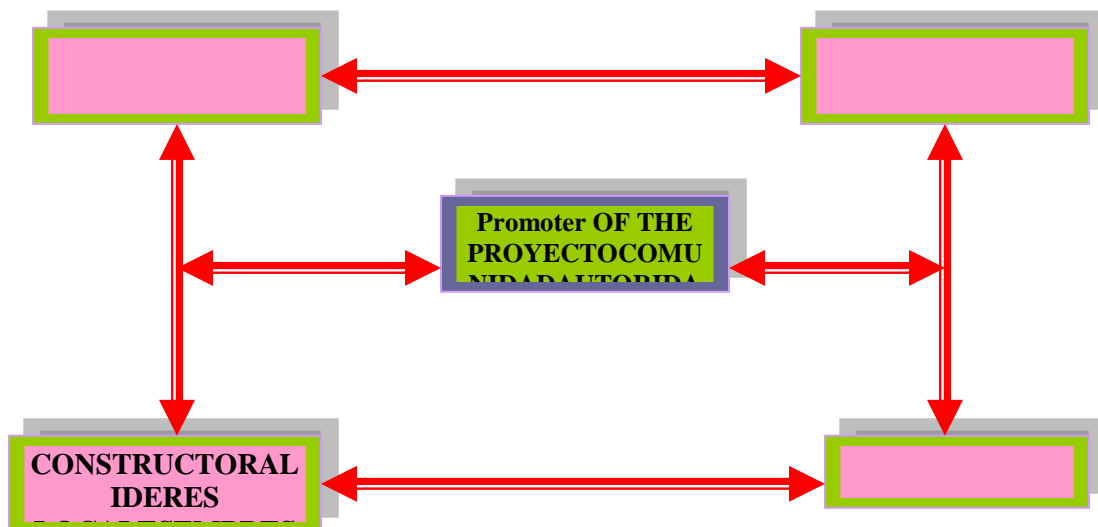
outside permissible limits, corrective measures will be necessary, such as vehicle maintenance, noise mitigation barriers, etc.

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.



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° 4. The results were satisfactory, in our view, 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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