

**BRAZIL - Additional Financing for the Teresina Enhancing Municipal Governance and
Quality of Life Project (P146870)
Lagoas do Norte Project – Phase II**

**Environmental and Social Impact Assessment Report
EXECUTIVE SUMMARY**

Municipality of Teresina, Piauí

January 2015

EXECUTIVE SUMMARY

Introduction

The objective of this document is to summarize the expected environmental and social benefits and risks associated with the proposed additional financing of the Teresina Enhancing Municipal Governance and Quality of Life Project (P146870) (*Lagoas do Norte* Project - LNP II). It presents a summary of the Environmental and Social Impact Assessment as well as the Management Framework prepared for the proposed Phase II operations, baseline environmental and social conditions, the likely risks and benefits of the operation and proposed mitigation measures to be followed. A more detailed description of the approach to be followed under the project can be found in the Environmental and Social Impact Assessment Report of November 2014.

LNP II, coordinated by the Secretariat of Planning in the Municipality of Teresina, is aimed at continuing and optimizing the investments made during Phase I, with total investments in the amount of R\$396.88 million (US\$176.39 million) of additional financing being proposed over a five-year period in integrated activities in the social, economic, housing, infrastructure, and urban and environmental renewal areas targeting the sustainable development of the *Lagoas do Norte* region.

The objectives of LNP II are to: (i) modernize and improve the management capacity of the Municipality of Teresina in the financial, urban, environmental, basic service delivery, and economic development areas; and (ii) improve the quality of life of the residents living in the area covered by the *Lagoas do Norte* Project, with emphasis on Areas 2 and 3, but with interventions also taking place in Areas 1 and 4.

Phase II of the project is divided into three components, which are explained in detail on Page 2:

Component	INVESTMENT VALUE IN US\$
Component 1 – Modernization of Municipal Management, City Development, and Project Management	15,897,742
Component 2 – Integrated Environmental Urban Development in <i>Lagoas do Norte</i>	153,849.24
Component 3 –Economic and Social Development in <i>Lagoas do Norte</i>	6,644,444
Total	176,391,433

The areas covered by the project are shown in the figures below:

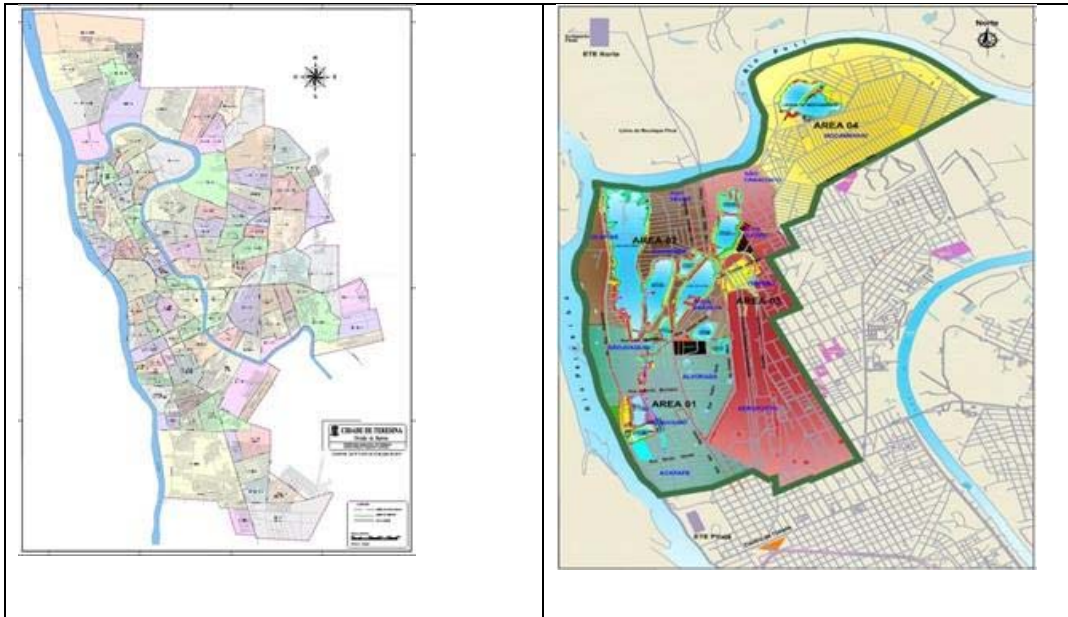


Figure 1- AREAS COVERED BY THE PROJECT

Source: LNP Performance Report, 2014

Baseline Conditions in the Project Area

The *Lagoas do Norte* region, located at the confluence of the Poti and Parnaíba Rivers, is highly vulnerable from an environmental standpoint due to its fluvial/lacustrine configuration with a vast, low-lying, flood-prone area that has been modified by hydraulic interventions over the past 40 years such as the construction of dams, the interconnection system for lagoons, and the system established for controlling water levels.

During the rainy season, water levels rise considerably in the Parnaíba and Poti Rivers, particularly during the month of April, when rainfall is torrential. This rise in water levels leads to the overflowing of banks and, as a result, to the flooding of the low-lying areas at the confluence of the rivers. This is a natural phenomenon common to many other fluvial riparian areas. In the *Lagoas do Norte* region, however, urban sprawl has exacerbated and disrupted natural processes, negatively impacting the quality of life of the population.

The problems created by urban sprawl and improper land use in the *Lagoas do Norte* region include: (i) partial or total fill in of the lagoons and the building of houses in these areas; (ii) building of houses near the dikes of the Poti and Parnaíba Rivers; (iii) occupation of areas located below the annual floodwater levels of rivers and lagoons; (iv) clay extraction, using crude techniques, to make ceramics (arts and crafts), which expands the lagoon areas and creates a number of new craters and holes, some of which are associated with the current lagoons; (v) occupation of areas designated as permanent preservation areas under the National legislation; (vi) planning and implementation of public roads without taking into consideration the existing topography and seasonal nature of flooding; and (vii) use of the rivers for tourism and recreational purposes under inappropriate conditions.

The initial effort of the Municipal Government to tackle the problems in the *Lagoas* Region entailed implementation of the *Lagos do Norte* Project. The LNP I, financed by the World Bank, was approved in October 2008, in the amount of US\$44.47 million, and is currently in the final stages of execution.

The LNP II, which will also be financed with a World Bank loan, will continue to implement the same type of interventions already made in the *Lagoas do Norte* region.

Description of the LNP II Project

The current project design reflects the updating/revision of the original (2006) design, based on the experience acquired during Phase I, the lessons learned, and the analysis of alternatives to the interventions initially³

envisioned. The Municipality of Teresina, the Project Management Unit, the project company hired to develop the basic and design projects, the consultants hired, and the World Bank team actively participated in this updating/revision process. These studies led to the following components, the details of which are provided below:

Component 1 – Modernization of Municipal Management, City Development, and Project Management, which will include three subcomponents, in addition to project management:

- Institutional development of the Municipality of Teresina;
- Preparation of studies, master plans, and strategic projects for the city and execution of the supplementary requirements of the Environmental and Social Management Plan (ESMP) projects;
- Project management.

Component 2 – Integrated Environmental Urban Development in *Lagoas do Norte*. The physical interventions under this component will be aimed at improving basic urban service delivery and the environmental conditions in the project intervention area. The planned interventions are grouped into three subcomponents:

- Local renewal – urban and landscape design;
- Sanitation, drainage, and road system infrastructure;
- Engineering and architecture designs/projects and the supervision of works.

Component 3 – Economic and Social Development in *Lagoas do Norte*. This component will fund additional interventions that complement those under Component 2, including:

- Strengthening of community associations and other groups in order to improve access by families eligible for social programs, daycare, basic health services, education etc.;
- Environmental and sanitation education activities in the region;
- Programs to create local jobs and generate income;
- Renovation/expansion and construction of public facilities (health centers, schools, etc.) as an integral part of the improvement interventions under Component 2;
- Activities aimed at encouraging community mobilization and participation in intervention activities.

Results of Phase I

The results of Phase 1 of the LNP, which is being completed, are summarized below:

- **Reduced risk of flooding:** Flood protection for the local population and urban areas;
- **Environmental improvements:** Partial clean-up of the Cabrinha and Lourival lagoons and restoration and construction of green spaces;
- **Residents' wellbeing:** Building the self-esteem of residents and optimism regarding the future;
- **Recreational spaces:** A linear park was implemented, and its picture has been used in a post card of the city;
- **Cultural areas:** The Boi theater, one of the city's important cultural buildings, was restored with project resources and is now part of the National circuit for theatrical performances;
- **Road mobility:** Improved vehicular traffic flow and implementation of bike lanes;
- **Development of real estate** in the region and the establishment of new small businesses and business interests in the area;
- **Obtaining additional financial resources** from the Federal Government for new sanitation and urban mobility investments in the city, based on the Teresina Urban Drainage Master Plan (PDDU) and the Urban Transportation and Mobility Master Plan (PDTU);
- **Municipal institutional strengthening**, mainly for the Secretariats of Planning and Finance, resulting in improved management and higher municipal revenues.

Lessons Learned

Lessons Learned from Phase I of the Project include:

- Improved institutional capacity of Municipality of Teresina (PMT) to address the issues of urban and environmental renewal, land regularization, and the involuntary resettlement of families facilitated access by the PMT to Federal Government funding for sanitation, road network improvements, and macro-drainage activities as well as housing programs (such as the *Minha Casa Minha Vida*), administered by the National Investment Bank (*Caixa Econômica Federal*), among others.
- Enhanced institutional capacity, community participation, and project interventions resulted in greater environmental awareness of urban spaces and the importance of lagoons in the context of public spaces as a means of flood control;
- Highly complex, multidisciplinary interventions that are closely interrelated call for project details to be presented jointly. During the execution of Phase 1, the biggest problems that were faced involved hiring of engineering designs that were executed separately (particularly for drainage), without taking into consideration the real and potential linkages and synergies with other investments. This resulted in additional work by the local and World Bank teams, and this issue was finally resolved during the construction phase.
- The execution of projects (works) should also be planned in a way so as to identify and build on the linkages among the interventions, aiming at enhancing synergies and avoiding potential conflicts. Works should also be supervised by professionals working in different fields, including the environmental and social areas.
- The environmental results of a number of interventions in the environmental/water resource areas—such as the sewerage system—take longer to be achieved than mere completion of the execution of works. They depend on the level of support, proper operation of the system, and the purification capacity of the local environmental.
- The establishment and continued operations of a socio-environmental project unit (UPS) facilitated various socio-environmental activities in the area, as did the proximity to the local community and its participation in and support for the execution of interventions through a project steering committee.
- Community participation in both the detailed design of projects and in the execution phase led to enhanced quality and a better response to interventions.
- The urban and landscape concepts should be formulated so as to promote compatible economic activities that make it possible to obtain resources in the future to enable the autonomous management of linear parks.
- Projects of this nature—such as the renewal of degraded urban areas—offer various benefits to the population such as higher self-esteem, access to essential and high-quality public services, a greater sense of security, revitalization of the local economy, integration of individuals into the formal labor force, and higher real estate values.

Beneficiaries and Socio-environmental Safeguards

The beneficiary population is different depending on the objectives. For Component 1, the beneficiary population will be the residents of Teresina (830,000 persons), as it involves improvements to the organization of municipal management and the preparation of regional development projects. For Components 2 and 3, the beneficiary population will be mainly the residents of the lagoon areas of Pantanal, Mazerine, Jacaré, Piçarreira, Oleiros, Cerâmica Poty, and Cachorros (Areas 2 and 3), in addition to Lagoa do Mocambinho, home to 67,000 people, who will benefit from the interventions and improvements made under the LNP II.

The following interventions are planned under the LNP II: urban and environmental renewal, to be achieved through an integrated macro-drainage network, improvements to the road system (with emphasis on widening Boa Esperança Avenue), urban improvements along the banks of lagoons through the establishments of parks, a sewerage system, renovation and expansion of the Pirajá wastewater treatment plant (ETE), and improvement of the water supply system. Plans have also been made to resettle or provide safer housing units to 2,180 families living in flood-prone areas, environmental preservation areas, public buildings, or other places unfit for habitation.

Área contemplada com o PLN I		Bairros	População 2010	Área ha	
Área 1 Canal do Padre Eduardo		Acarapé	3.018	44,90	
		Matadouro	5.530	84,00	
		Alvorada	5.387	53,20	
		São Joaquim	10.558	11,32	
		Total área 1	24.493	193,42	
Áreas contempladas com o PLN II		Bairros	População 2010	Área ha	
Área 2 Lagoa dos Oleiros São Joaquim		Nova Brasília	6.780	71,69	
		Poti Velho	3.730	38,23	
		Mafrense	6.492	73,01	
		Olarias	1.561	101,02	
		Total área 2	18.563	283,95	
Área 3 Alto Alegre Aeroporto		Aeroporto	7.567	236,41	
		Itaperu	2.166	30,64	
		Alto Alegre	5.389	86,42	
			Total área 3	15.122	353,47
Área 4 Mocambinho		São Francisco	5.453	39,48	
		Mocambinho	28.385	327,70	
			Total área 4	33.838	367,18
			TOTAL GERAL	92.016	1.198,02

Figure 2- Neighborhoods and respective population contemplated by the Teresina Enhancing Municipal governance and Quality of Life Project in its two phases

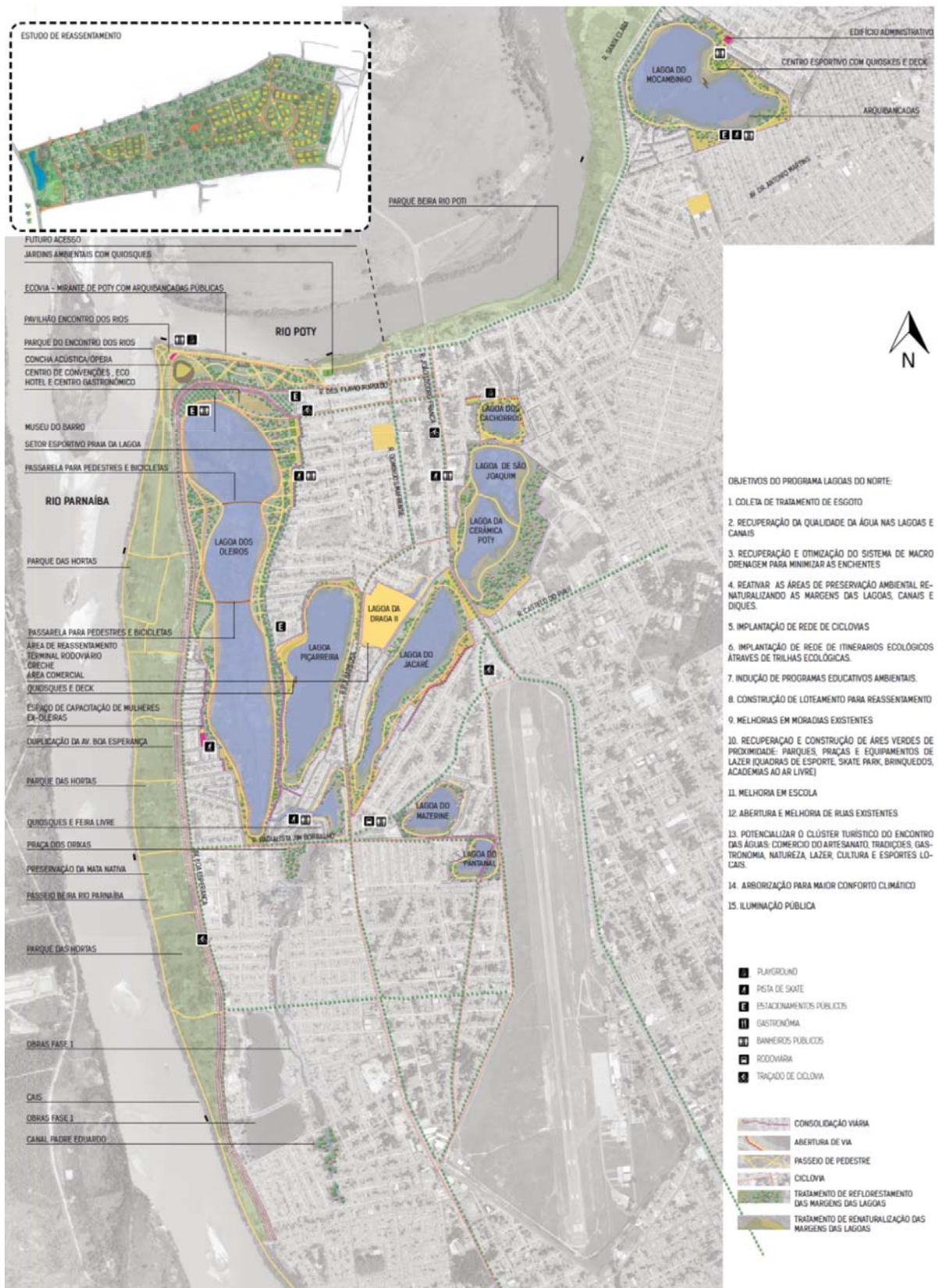


Figure 3 – PHYSICAL INTERVENTIONS TO TAKE PLACE DURING PHASE II OF THE LAGOAS DO NORTE PROJECT
 Source: *Consórcio Teresina Sustentável*, 2014.

Legal and Institutional Framework

For the purpose of the interventions planned under the LNP II, the main regulatory issues pertain to the environmental license to carry out the works and/or physical interventions, the licenses to harvest and use water, and the licenses related to the discharge of treated effluents in the Parnaíba River.

A preliminary license was granted by the state Environment and Water Resources Secretariat, SEMAR, for Phase I of the design of the *Lagoas do Norte* Project, with the interventions planned for Areas 1, 2, 3 and 4.

Licenses were also granted by the municipal environmental secretariat, SEMAM, for individual and specific investments. The preliminary license for the project as a whole is in the process of being renewed, while the installation licenses remain valid and include interventions in Areas 1, 2, 3, and 4.

ENVIRONMENTAL LICENSES ISSUED		
ISSUER: SEMAR/PIAUI		
ACTIVITY	TYPE	Valid until:
<i>Lagoas do Norte</i> Project	PRELIMINARY	12/04/2014
Establishment of the Sewerage System – Areas 1, 2, 3, and 4	INSTALLATION	30/09/2016
Establishment of the Linear Park – Areas 1, 2, 3, and 4	INSTALLATION	18/12/2015
Establishment of Macro-drainage System - Areas 1, 2, 3, and 4	INSTALLATION	18/12/2015
ISSUER: SEMAM		
ACTIVITY	TYPE	Valid until:
Widening of the Rui Barbosa Road (Uiraúna and Radialista Jim Borralho sections)	INSTALLATION	22/11/2014
Water Supply System; Improving and Strengthening of the Networks Covered by the LNP	INSTALLATION	08/11/2014
	To be renewed	
	Renewal in progress	

Table 1 – LIST OF ENVIRONMENTAL LICENSES ISSUED

Bearing in mind, however, that substantive changes were made during the updating and revision of project design for Areas 2 and 3 of *Lagoas do Norte*, the municipality of Teresina will submit this new design to the state environmental entity for renewal of the preliminary license, along with the basic plans related to the sewerage and macro-drainage systems.

Furthermore, an assessment must be done of the need to authorize the plan to pump water from the Parnaíba River to the Oleiros lagoon, taking into account the institution responsible for granting the concession and the small size of this river.

In the end, the following criteria will be adopted for granting environmental licenses:

- The overall design of Phase II of the project, based on the current Environmental and Social Assessment (ESA), must be submitted to SEMAR (as the state environmental licensing entity) in order to obtain renewal of the preliminary license;
- The macro-drainage and sewerage treatment infrastructure work (changes to and adaptation of the Pirajá Sewerage Treatment Plant (ETE) must be approved (renewal of licenses issued) by SEMAR, which may request additional environmental studies;
- Municipal licensing will be required for urban interventions, such as resettlement projects, road works, and the building of social and community facilities. The municipality may request additional environmental studies.

Environmental and Social Assessment

The Environmental and Social Assessment (ESA) carried out during the preparatory phase of the LNP II for the Municipality of Teresina is a World Bank requirement aimed at ensuring that the proposed solutions are directly aligned with resolution of the actual problems in the areas covered, in particular in relation to the environmental effects of the various specific interventions as well as their cumulative positive and potentially negative impacts. The ESA also aims at ensuring that any potential negative impacts are appropriately addressed in a timely manner during all phases of the project; that is, before and after lending decisions are made.

Because during this preparatory phase the full and detailed designs of the interventions and studies envisioned under Phase II of the World Bank-financed *Lagoas do Norte* Project have not yet been completed, the approach used for the Environmental and Social Assessment entailed evaluation of the interventions and alternatives proposed in the context of current legislation and their possible impact on strategic socio-environmental attributes, along with determination of the environmental and social assessment criteria and procedures that will be applicable to the design and implementation of specific interventions during the project implementation phase.

Consequently, in addition to the traditional environmental impact assessment of individual interventions, an effort is being made to analyze the environmental dimension in the decision-making process, taking into account in particular the World Bank's safeguard policies and procedures for Category A projects.¹ This classification is based on the nature of the activities proposed and the potential for negative impacts on communities, as well as environmentally protected and cultural heritage areas. The following World Bank safeguards are triggered by the project: OP 4.01 – Environmental Assessment; OP 4.04 - Natural Habitats; OP 4.12 – Involuntary Resettlement; and OP 4.37 – Safety of Dams.

Analysis of Design, Technical and Locational Alternatives

The design of the LNP I and Environmental and Social Assessment during the project preparatory phase in 2006 took into account macro-drainage, water supply, sewerage, urban and landscape design, road network, etc. for Areas 1, 2, 3, and 4 as a whole.

During the preparatory phase of the LNP II however, an analysis was done of alternative interventions that resulted in design changes. The alternatives listed below were analyzed:

Macro-drainage: In 2014, Tucci and Souza, in a study entitled “Inundation Control and the Maintenance of the levels of the Lagoas do Norte region: Hydrologic and hydraulic simulations of the flooding scenarios”, have reevaluated the macro drainage global system and the Lagoas do Norte region. In it they simulated scenarios along the years in which interventions will be made.

The studies aimed at simulating and projecting a 25-year risk of flooding conditions in the ponds of the system that flow into Oleiros lagoon. In this system many scenarios were studied, which permitted the authors to obtain the maximum inundation levels to the return time referred in the ponds, considering the operational pumping rule in Oleiros lagoon with levels of 53.5, 54.0 and 55.0 meters.

The maintenance of the 55.0m level in Oleiros lagoon is the most convenient operational scenario, because it minimizes the expropriation conditions due to flooding and because it allows the level of water to be maximized in the beginning of the dry season. The study has also verified the scenario for a 50-year outflow during the period of high discharge, showing that the impacts are limited and therefore ensuring both the objective and the results of the flooding control.

Aside from the scenarios studied predicting flooding situations, some scenarios that considered the possibility of drought were also analyzed – considering the maintenance of permanent levels.

To some lagoons, the maintenance of the levels is almost permanent, of about 95%, whose levels allow a great part of the lagoon to be maintained, as it is the case of the following ponds: Acarapé II, Piçareiras, Pantanal and Mazerine. Cachorros and Cerâmica lagoons do not maintain their levels, but, if the rule is changed by using floodgates, it is possible to increase the time of high water levels, making them stable for a great part of the year.

¹ A project is classified by the World Bank as “Category A” if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented.

The rule is quite simple, it would only be necessary to close the discharge pipe that connects the ponds from May to October. In Jacaré lagoon and in São Joaquim lagoon there is a limited action, as the levels of transference are quite high and it is not possible to be increased due to flooding risks. In the case of Acarapé I lagoon and in the channel used for navigation, the discharge pipes must be closed from May to October.

In the case of the Oleiros lagoon, two alternatives were also analyzed:

- Maintaining levels at 54 meters using the water available in the lagoon system. This alternative covers a lake area of 311,000 m². The projected area of the Oleiros lagoon is 405,659 m². There will, however, be some days in the year when 95,000 m² of the lagoon area will be without water;
- Maintaining levels at 55 meters. To achieve this, water will have to be pumped from the Parnaíba River to supplement the volume necessary to keep the level at 55 meters.

The Municipality of Teresina chose the option of maintaining the level at 55 meters and to pump water from the Parnaíba when levels fall below 55 meters. This decision is essentially based on the urban and landscape design, to be promoted using environmentally restored lagoons and to include a “tourist cluster” in the northern section of the lagoon with an *Encontro das Águas* [water confluence] Park. In addition, it has been confirmed that the flow rates necessary to maintain the levels in the Oleiros lagoon are not high (maximum 30.3 liters per second for a minimum flow rate of 261,100 liters per second from the Parnaíba River).

Sewerage System – Pirajá Wastewater Treatment Plant: The preliminary design of the sewerage system in Areas 1, 2, 3, and 4, which is part of the original project, covers:

- Construct collection and pumping networks in Area 1 with channeling toward the Pirajá Wastewater Treatment Plant;
- Rehabilitation of the Pirajá Wastewater Treatment Plant to accommodate the effluents in Area 1;
- Draining of Areas 2, 3, and 4 and redirecting their effluents, through an outfall, to a sewerage treatment plant to be built outside the project area, more specifically at a site located on the right bank of the Parnaíba River, approximately seven kilometers after its confluence with the Poti River.

In view of the fact that the Piauí state water utility (AGESPISA) is setting up a nearby water treatment plant (ETA) downstream of the site originally planned for the North wastewater treatment plant (ETE), which would require extension of the sewerage outfalls in Areas 2, 3, and 4 to downstream of the water treatment plant under construction, an effort was made to find another alternative for the sewerage system. The alternative identified was the rehabilitation and expansion of the Pirajá Wastewater Treatment Plant.

Based on this analysis, it was determined that:

- The choice of the Pirajá Wastewater Treatment Plant (upgraded and expanded) would eliminate the need to build a new long and wider outfall;
- The transfer of sewage to a new sewage treatment plant (right bank of the Poti River) would require an opening through the Mariano Gaioso C. Branco Bridge. Structural reinforcements would probably be needed to allow it to accommodate additional load;
- The construction of the new sewage treatment plant would entail the expropriation of land;
- The cost of electricity, taking into account sewage pumping, is higher in the case of construction of a new sewage treatment plant;
- Maintenance and operating costs are lower for the Pirajá Wastewater Treatment Plant, which is already operational, compared to a new sewerage treatment plant, given the higher personnel costs;
- The Pirajá Wastewater Treatment Plant is located in an urban area with consolidated occupied areas and a new sewerage treatment plant would require environmental changes, with the additional cost associated with environmental control measures;
- The Parnaíba River Self-Purification Study (Tucci, 2014) demonstrates the adequate self-purification capacity of the river under the increased flow rates resulting from the Pirajá Wastewater Treatment Plant, without compromising construction of the water treatment plant (ETA).

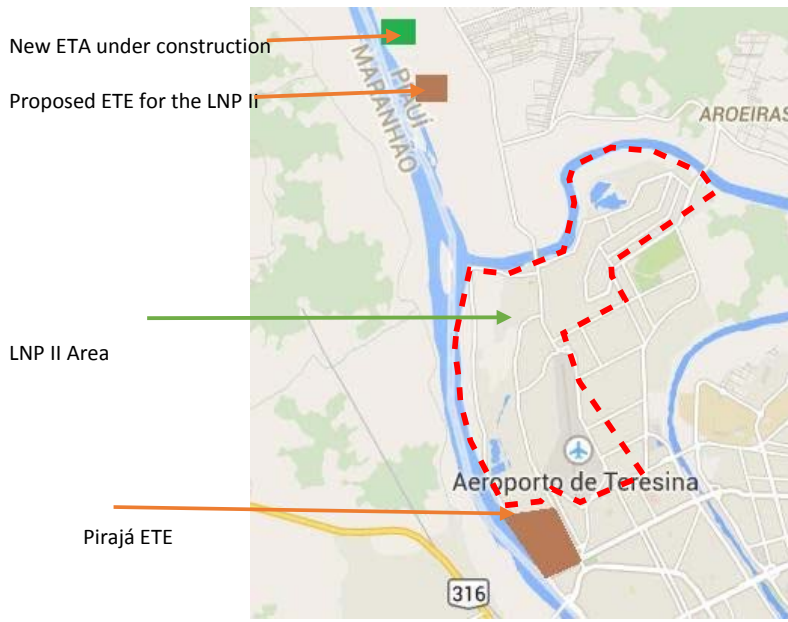


Figure 4 – ALTERNATIVE LOCATIONS BETWEEN THE NORTH ETE AND THE CHANGES TO/EXPANSION OF THE PIRAJÁ ETE UNDER THE LNP II

In this case, the alternative chosen involved channeling sewage from Areas 2, 3, and 4 to the Pirajá Wastewater Treatment Plant, as shown in Figure 3 above, and its current expansion to accommodate secondary treatment with a flow rate of 340 liters per second and, in twenty years, a flow rate of 420 liters per second.

Urban and Landscape Design on the Lagoons’ Riparian Areas (Permanent Preservation Areas). Two different scenarios were analyzed:

- a) Rehabilitation of the Permanent Preservation Areas (PPAs) of lagoons with a 30-meter wide strip from the maximum level established in the Study on Maximum and Minimum Levels of Lagoons, with the addition of a 10-meter strip for sanitation facilities, road access, etc. A Linear Park is expected to be established in this 40-meter strip.
- b) Rehabilitation of the Permanent Preservation Areas of the lagoons based on an urban design that makes provisions for future consolidated housing in PPAs (in keeping with the criteria set forth in CONAMA Decision 396/2006), using a “landscape windows” design, thus seeking to minimize the need for resettlement without compromising the urban environment concept.

The first scenario would call for the full relocation of close to 1,214 properties and the partial relocation of 65. The second scenario would call for the relocation of 763 properties and close to 131 partial relocations (backs of lots).

The second scenario appears to be more suitable, based largely on the significant reduction in the need to relocate properties in the APPs.

Environmental and Social Assessment Methodology

The results assessment approach is based on the adaptation of this study to the Pressure-State- Response (PSR) Methodology used by the OECD countries to define public policies, whether they relate to preservation or the promotion of development. This approach is in line with strategic environmental assessment methodologies that are aimed at assessing not only interventions but, more importantly, procedures, programs, and policies.

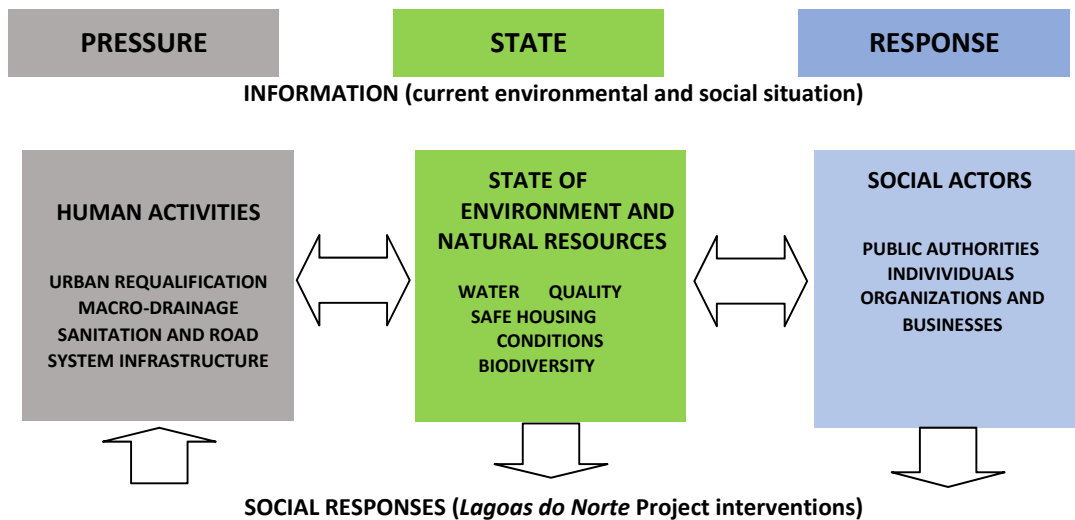


Figure 5 – PRESSURE-STATE-RESPONSE METHODOLOGY

Source: OECD, adapted by Technum Consultoria, 2014

The Environmental Assessment involved an analysis of projects and interventions, with the aim of introducing the environmental component into the decision-making process, in addition to the economic and social components and, in so doing, helped raise awareness that the potential environmental impacts must be a central rather than a peripheral factor in project development. Inclusion of the environment in decision making is therefore an essential prerequisite on the path to sustainable development.

Overall the main environmental impacts of the project are positive, and the environmental assessment includes a detailed list of the identified environmental and social impacts resulting from the implementation and operational phases; and includes associated mitigation measures are proposed in order to minimize this impact.

As expected, most of the negative impacts arise from the execution of civil works for the infrastructure systems — basic sanitation, macro-drainage, road system, and urban requalification² — which are temporary and inherent to the type of works in question. Appropriate design and project criteria will be adopted to significantly minimize the possibility of occurrence of those disturbances.

Nonetheless, 2,180 families who are currently occupying the hazard areas, the PPAs, and the works zone itself, will need to be resettled as a result of the interventions.

Most of the positive impacts will occur when those systems are operational, and in the implementation of Components 2 and 3, which will involve enhanced income generation opportunities, the professionalization of small businesses, and an increase in the number of municipal organizations involved in project implementation.

The interventions will alter social and environmental conditions in the area of direct influence, and will have beneficial effects for the entire city (area of indirect influence – All).

Application of World Bank Safeguard Policies

In addition to current National, State and Municipal legislation, the legal and institutional guidelines used for the environmental and social assessment of specific project interventions take into consideration the World Bank's Operational and Safeguard Policies, as described below. The following safeguards are relevant to the proposed project and have been complied with: OP 4.01, Environmental Assessment; OP 4.04, Natural Habitats; OP 4.11, Physical Cultural Resources; OP 4.12, Involuntary Resettlement. The issue of the safety of the dikes in the Poti and Parnaíba rivers was also considered, as covered by OP 4.37, Safety of Dams.

² Urban requalification refers to the redevelopment of an urban space in order to improve and regenerate its physical and socio-economic conditions by involving residents and public and private entities.

Environmental Assessment (OP 4.01) – The project underwent an ESA, following the Bank’s guidelines for a “Category A” project. The project includes interventions related to: (i) urban and environmental renewal, of local scope; and (ii) social and institutional development actions. Measures to mitigate the negative impacts have been included in an Environmental and Social Management Plan (ESMP), specifying the associated costs, implementation responsibilities, and implementation schedules.

The objectives of the LNP II and design of its different components include interventions to upgrade urban conditions, involving sanitation, macro-drainage, improvements to the road system, and urban requalification, which will improve the population’s quality of life.

Natural Habitats (OP 4.04) – As the intervention involves important ecosystems — the group of lagoons and their PPAs, which are protected by law— this safeguard was triggered, taking into account actions to revitalize the natural environments affected—basically the lagoons, which are currently heavily polluted. Settlements will be removed from the areas surrounding the lagoons (PPAs), making it possible to improve that environment and protect the aquatic ecosystem. Environmental recovery will be achieved as a result of macro-drainage actions, including stabilization of the lagoons’ environment, with a view to maintaining the permanent water body but avoiding floods that overwhelm the area in the rainy season, in addition to the creation of linear parks.

The ESMP specifies the actions to be undertaken in the lagoons, including recovery of fauna, clean-up, and complementary environmental recovery procedures.

Involuntary Resettlement (OP 4.12) – The various macro-drainage and sanitation sewerage works, along with the removal of populations from flood-prone areas, will affect 1,730 properties, require the resettlement of 2,180 families, and the provision of other forms of compensation. Resettlement will be needed mainly for the macro-drainage works and recovery of the PPA of the lagoons. A smaller number of people will also need to be resettled as a result of the works on the road system. The largest-scale intervention will be widening of Boa Esperança Avenue including lane division, which will require the resettlement of families and compensation for businesses.

There will be no resettlements in the first year year of project implementation, during which the final engineering executive designs and involuntary resettlement plans will be developed. The elaboration of final engineering designs will aim to minimize the number of relocations needed, with a view to preserving the network of social, cultural, and economic relations that exist in the places of origin, and providing services that are essential to the quality of urban life in the places of resettlement. To guarantee those requirements, an involuntary resettlement framework has been prepared and approved by the Bank, and this will govern the preparation and implementation of resettlement plans prior to the execution of works. Final resettlement plans will be submitted to the Bank for approval before their implementation starts.

Physical Cultural Resources, Protection of Cultural Heritage (OP 4.11) – No interferences have been detected in archaeological sites in the activities and interventions proposed in the Project. There is, however, a rich cultural activity in the community, which is connected to afro-Brazilian ceremonies and there is a demand from the local community for the construction of an adequate place for memory and for worship, which has been included in the project. The cultural tradition of handicraft, both general and the one produced with clay, are also proposed to be protected through the planned construction of a cultural center financed under the project.

Safety of Dams (OP 4.37) – The duplication of Boa Esperança Avenue and the area destined to be a tourism cluster make it important to be extra careful with regards to the safety of the existing dam – during preparation of the LNP a dam safety panel found no issues with the structure of the dam. Nevertheless, a dam safety panel will be conformed to review the detailed engineering designs before construction starts. Aside from the implementation of the urban requalification works, additional measures are recommended, such as ensuring that the designs for the road system are consistent and adhere to the city’s the Plan for Mobility and Transportation, the law on sidewalks and the law on urban occupation of the municipality, in a manner that prohibits the occupation of the margins of the dam.

Overall Assessment

The Environmental and Social Assessment confirms that, if properly implemented, the investments proposed under the LNP II should fulfill their main objectives, namely to: (i) modernize and improve management capacity in the Municipality of Teresina in the financial, urban, environmental, basic service delivery, and economic

development areas; and (ii) improve the quality of life of the residents living in the area covered by the *Lagoas do Norte* Project.

The proposed set of interventions should also promote a wide-ranging process of urban and environmental renewal in the region, with important and significant social and economic implications for both in the region and the Municipality of Teresina.

Adherence to the environmental construction manual will mitigate many of the negative impacts associated with construction, and the municipality is committed to continue with the plans for citizen engagement and a strong communication plan in order to facilitate project implementation overall and specifically related to resettlement.

Social and Environmental Management Plan

The ESMP includes the requirements set forth in the World Bank's Safeguard Policies. This is based on the environmental assessment contained in the Environmental and Social Assessment Report (ESAR), as well as in the requirements specified by the state Secretariats of the Environment and Water Resources, and the Municipal Environment Secretariat for environmental licensing of the works covered by the LNP II.

The ESMP provides for socio-environmental and institutional strengthening interventions that aim to mitigate the potential negative impacts identified in the ESA and maximize the positive effects of project interventions through control and monitoring actions.

The proposed interventions are presented with a description of their objectives and main activities to be undertaken during the course of the *Lagoas do Norte* Project, with their level of detail depending on greater specification of project solutions in each of the proposed actions, a large portion of which will be financed by the LNP II. The following table shows the interventions supported under the ESMP.

No.	Project	Content	Cost	Responsible Entities
1	Socio-environmental management of the project.	Supervision of the ESMP	Included in Project Management Unit (PMU) costs.	PMU-Socio-environmental Unit (UPS).
2	Socio-environmental management and supervision procedures throughout the program cycle.	Environmental assessment of the projects, holding of public hearings, and monitoring of the issuance of environmental permits.	Included in project management cost (PMU).	PMU-UPS
3	Program for mitigation and compensatory measures	Monitoring of the impacts of the works and interventions, particularly the <i>Boa Esperança</i> Avenue and dike widening and lane division works and the ETE Treatment System.	To be included in the interventions envisaged.	PMU/UPS, Municipal Administration and Human Resources Secretariat (SEMA), and state Environment and Water Resources Secretariat (SEMAR).
4	Institutional strengthening of environmental management	Implementation of the activities and equipment envisaged in the modeling of the new municipal environmental body.	500,000.00	PMU and PMT
5	Environmental monitoring of water quality	Assess water quality in the lagoons; and evaluate water quality in the river downstream from the ETE discharge.	100,000.00	PMU.
6	Recovery of fauna	Carried out prior to the lagoon clean-up operation in Areas 2 and 3	150,000.00	Environment Secretariat, PMU, and consulting services
7	Environmental Construction Manual (MAC)	Works inspections; Works control procedures to be adopted by the construction companies.	Included in works costs	PMU and building contractors.

No.	Project	Content	Cost	Responsible Entities
8	Social Outreach	Publicity for the works among the local population and community of Teresina; Community participation activities.	100,000.00	PMU and consulting services.
9	Environmental and health education	Support for resettlement and control of works in relation to environmental and health education. Environmental education activities for ownership of the parks works and building self-esteem through knowledge of habitat (fauna and flora).	320,000.00	PMU and consulting services.
10	Resettlement and compensation for families and businesses.	Family resettlement caused by the works, PPAs, and areas of environmental and social risk. Families in the dike areas.	58,632,489.00	PMU – UPS
11	Contingency and risk reduction	Early warning plan for potential floods and/or rising water levels in the <i>Poti</i> and <i>Parnaíba</i> rivers.	170,000.00	PMU, consulting services and Civil Defense.
12	Management of health sector solid waste	Collection, treatment, and adequate final disposal of the solid waste generated by the Basic Health Units	20,000.00	PMU, Municipal Health Secretariat.

Socio-environmental Management of the Project

The project outlines the structure and functioning of the LNP II environmental management, which involves the following:

- **Coordination of Environmental and Social Management (Environmental supervision)**, performed by a specialist allocated at the UGP, who will be responsible for the coordination of socio-environmental actions of the Project but who will still be subordinated to the Executive Coordination of the UGP.
- **Environmental supervision of construction sites**, performed by hired specialist(s) from the supervising company, who will be responsible for surveillance, for accompanying the progress of the construction, for orienting environmental measures related to the Environmental Construction Manual (MAC) and for the mitigating measures specified in the environmental licenses, in this proposal of management and in the other programs of the SEMP.
- **Environmental Planning of Construction sites**. The environmental planning actions of the constructions are responsibility of the constructing companies, which must follow the Environmental Construction Manual (MAC) and implement the mitigating measures specified in the environmental licenses and in Construction Bid Notice.

Socio-environmental Management and Supervision Procedures throughout the Project Cycle

During project implementation, the PMU will adopt different socio-environmental procedures for each component, in the following phases:

- **Details of studies and projects**, involving: (i) environmental assessment of the projects; (ii) mitigation measures and specific environmental management plans; (iii) dissemination procedures and public hearings.
- **Environmental licensing**, procedures for awarding environmental licenses for the interventions.
- **Bidding process**, including environmental criteria in the works bidding and contracting documents.
- **Works execution – physical intervention**, including a description of works environmental planning and environmental supervision activities.

Program of Mitigation and Compensatory Measures

This program seeks to specify all mitigation measures arising from the environmental assessment, for the purpose of measuring and evaluating the costs arising from the necessary actions, which aim to include the environmental dimension in the project's interventions. This program also includes measures to enhance the positive impacts, with a view to increasing and multiplying the positive impacts of the interventions.

Institutional Strengthening of Environmental Management

During the preparation of the additional financing, the PMU conducted a wide-ranging study of the status of municipal environmental management and strengthening needs, which resulted in a number of institutional, technical, and administrative measures to be implemented by the PMT. Within the project, the interventions selected for financing by the LNP II were the most structural and emergency-related ones, such as a review and optimization of their current organizational structure, reform of their current facilities and computer equipment. The other measures will be implemented with PMT budgetary funding.

Monitoring of Water Quality

The project provides for an increase in the number of sampling points in the current monitoring program involving the Parnaíba River, the effluents from the Pirajá ETE, the Poti River and the lagoons in the *Lagoas do Norte* complex. There will be 12 points from which quarterly samples will be drawn and analyzed.

Recovery of Fauna

Procedures are defined for preserving fauna prior to and during the clean-up of the lagoons of the *Lagoas do Norte* complex.

Environmental Construction Manual (MAC)

The works envisaged in the LNP II pose a potential environmental risk that should be prevented by applying good engineering practices to attenuate any environmental harm that may arise and implement recovery procedures in areas that may become degraded.

This project includes a review of the MAC, which will be incorporated into the bidding processes to enable the firms to have prior knowledge of its conditions, which will constitute a contractual requirement.

The review of the MAC must include the following items at a minimum: (i) socio-environmental management system governing the execution of the undertaking, defining responsibilities for coordination, supervision, and environmental planning, and specifying the documents and plans that will need to be prepared during all phases of the works; (ii) environmental actions and rules relating to the implementation and management of the works, including a plan for coexistence with the works: (a) works site; (b) risk management and emergency actions in the construction process; (c) environmental education for the workers and a code of works conduct; (d) health and safety in the works; (e) management and disposal of waste; (f) noise control; (g) equipment yard; (h) traffic control; (i) service roads; and other associated environmental issues and hazards. Plans should be in place for the monitoring and recovery of the areas covered by the loan, and garbage dump areas, as well as other areas that may become degraded during the works activities. Other issues to be included in this review include works environmental planning and environmental supervision.

Social Outreach

The Social Outreach Program is based on the belief that communication is absolutely fundamental for clarifying issues and raising public awareness of the importance of the undertaking and the alterations to their physical and social space, which will have a major impact on their standard of living.

Undertakings of the scope of the *Lagoas do Norte* project require special procedures for communication between the contractor and local society, in at least two basic areas: one relating to the provision of systematic information and clarification to the community and the creation of communication channels between the latter and the contractor; and the second, relating to the consolidation of appropriate modes of coexistence with the community.

Health and Environmental Education

The environmental education program of the *Lagoas do Norte II* project will continue work that has been ongoing in the first phase of the LNP, which was one of the factors ensuring successful dialogue with the community, and a guarantee of meeting the IBRD's environmental requirements, as well as Brazil's legislative environmental laws. On that point, preliminary terms of reference are established for the implementation of this program.

Resettlement and Compensation for Families and Businesses

In view of the need to adopt procedures for expropriation, population resettlement and compensation, including complying with the World Bank Social Safeguards, an involuntary resettlement and compensation framework has been drawn up, which defines the principles and guidelines to be adopted, and will serve as a guide for planning and implementing the involuntary family resettlement actions in the LNP II.

Risk Contingency and Reduction

This establishes a system for monitoring water flows and levels in the Parnaíba and Poti rivers and the main lagoons in the *Lagoas do Norte* complex, together with a system of forecasting and early warning of the occurrence of critical riverbank overflow and drought events.

Management of Health Sector Solid Waste

Given that the LNP II will need to support the remodeling and construction of Basic Health Units (UBS) in the project intervention area, the project will support the preparation of Health Sector Waste Management Plans (PGRSS), pursuant to CONAMA Decision 358/2005 and ANVISA directives.

Outcome of the Public Consultations

As part of the preparation of Phase II of the LNP, the Municipality of Teresina and the *Lagoas do Norte* PMU held meetings with the local community to present and discuss the planned interventions.

In the final phase of preparation, the following environmental and social documents were produced in compliance with the World Bank's environmental and social safeguards, and these were then disseminated and discussed at a meeting held for this purpose with the community and at a public consultation:

- Executive summary of the environmental and social assessment
- Environmental and social assessment and framework for the project's environmental and social management
- Conceptual framework of the resettlement and compensation policy

The documents were posted on the website of the Municipality of Teresina and were available for downloading as of October 23, 2014 (<http://www.teresina.pi.gov.br/>).

For the purpose of holding the hearings, the Municipality encouraged participation by extending invitations to state and municipal public entities, residents' associations (about 100 associations) NGOs, etc.

On November 4, 2014, a meeting of the *Lagoas do Norte* Forum was initially held with representatives of the local communities and NGOs. In the evening (7 pm), a public hearing was held, with the following agenda:

- Opening remarks, including presentation of the objectives of the hearing, information on dissemination and access to the documents produced;
- Presentation of the design of the project and its components;
- Presentation of the environmental and social studies, their main conclusions, and the ESMP;
- Collection of written questions formulated by the audience, clarifications made by the presenters, and

corresponding discussions;

- Opportunities for the audience to raise new questions, points of view, etc., and discussion;
- Closing.

The team organizing the hearings documented the list of attendees, along with audio recordings to accompany the respective minutes of the consultation. Mobilization by the event organizing team was very effective, with 180 persons participating.

In general, in both the meetings, highly favorable opinions were expressed of the project and its components. The atmosphere was one of harmony and integration, and the questions raised were aimed at seeking clarification, making suggestions, etc. The discussions were very interesting, involving active participation by the audience and “satisfaction” with the responses provided.

The report on the minutes of the Public Consultations, together with a list of persons attending, can be found in Annex 6 of the project’s Environmental and Social Assessment Report (ESAR).