

**INTER-AMERICAN DEVELOPMENT BANK**

**BRAZIL**

**Embraport  
(BR-L1159)**

**Environmental and Social Management Report  
(ESMR)**

**September 30, 2010**

|                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Project Team:</b> John Graham (Leader SCF/INF); Esteban Sarzosa (SCF/INF); Jean-Marc Aboussouan (SCF/INF); Eloise Canfield (VPS/ESG); Ernesto Monter (VPS/ESG)</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## **TABLE OF CONTENTS**

- 1 INTRODUCTION**
- 2 OPERATION DESCRIPTION**
  - A. Site Location**
  - B. Project Components**
  - C. Project Workforce, Schedule, and Cost**
  - D. Analysis of Alternatives**
- 3 OPERATIONAL COMPLIANCE EVALUATION**
  - A. Institutional Framework**
  - B. Legal Framework**
  - C. Project Compliance**
- 4 ENVIRONMENTAL AND SOCIAL SETTING**
  - A. Physical Environment**
  - B. Biotic Environment**
  - C. Socio-Economics**
- 5 ENVIRONMENTAL AND SOCIAL IMPACTS AND RISKS**
  - 5.1 Construction Phase**
    - A. Physical Environment**
    - B. Biotic Environment**
    - C. Social Impacts and Risks**
  - 5.2 Operation Phase**
    - A. Physical Environment**
    - B. Biotic Environment**
    - C. Social Impacts and Risks**
    - D. Cumulative Impacts**
- 6 MANAGEMENT OF ENVIRONMENTAL AND SOCIAL IMPACTS AND RISKS**
  - 6.1 Construction Phase**
  - 6.2 Operation Phase**
  - 6.3 Environmental and Social Monitoring Programs**
- 7 PUBLIC CONSULTATION**
- 8 REQUIREMENTS**

# 1 INTRODUCTION

- 1.1 The Bank has evaluated potential IDB financing for the development, construction, operation and maintenance of *Empresa Brasileira de Terminais Portuários S.A.* (“Embraport” or the “Company”), a fully-private greenfield container and liquid bulk port terminal located in the Municipality of Santos, on the coast of the State of São Paulo in Brazil (the “Project”). The Project would be the largest private port terminal in Brazil with a total investment estimated at US\$1.0 billion. The financing for the Project would take the form of a long-term IDB A Loan facility of approximately US\$100 million as well as a parallel B Loan facility from *Banco Nacional de Desenvolvimento Econômico e Social* (“BNDES”) of approximately US\$250 million.
- 1.2 The Project consists of the design, financing, construction, operation and maintenance of a private port terminal that will be capable of handling both containers and liquid bulk (primarily ethanol). The terminal will move third party traffic as well as the sponsor’s own cargo. The new terminal will be located in one of the few large waterfront sites on the northeast bank of the Port of Santos, a site of approximately 1,000,000 square meters (m<sup>2</sup>). There is access to the project site both via railroad and two major roads that currently serve Port of Santos.
- 1.3 The Project was first identified as a critical project in the Port of Santos Master Plan 2009-2024 funded by the IDB in 2008. The results of the plan indicated that the Port of Santos must triple its capacity in the next 15 years. At present, there are waiting lines of 100-150 ships anchored outside the port awaiting calls with average wait times of anywhere from five to ten days. This is particularly problematic for container vessels that operate on tight schedules, with delays at one port causing missed arrival windows at subsequent ports of call. This creates hundreds of millions of dollars of additional costs annually, all of which is passed on to the consumer, resulting in increased costs of imports and less competitive Brazilian exports.
- 1.4 Embraport will be one of the largest port facilities in Brazil with conditions for an efficient container terminal including berth length, patio area, landside connectivity and reasonable proximity to the Santos access channel. The Project Company, Embraport – *Empresa Brasileira de Terminais Portuarios S.A.* was incorporated in Brazil as a sociedad anonima with the purpose of managing the design, financing, construction and maintenance of a private mixed-use terminal. The ownership of the Company will include Odebrecht Transport Participacoes S.A. of Brazil (57.9%), Dubai Ports World of the United Arab Emirates (26.9%), and the Coimex Group of Brazil (15.3%).

Embraport had prepared the Environmental Impact Assessment (EIA) and Environmental Impact Assessment Public Disclosure Report (RIMA) in 2003. The EIA and RIMA were submitted to IBAMA in 2004 and were disclosed to the public at a hearing in Santos on February 15, 2005. IBAMA issued a Preliminary License for the Project in 2005 and the Installation License was issued in 2006. Embraport has acquired the required environmental and project permits. In addition, the project has prepared the relevant environmental and social management plans and has carefully analyzed environmental and social issues related to the project.

## **2 OPERATION DESCRIPTION**

### **A. Site Location**

- 2.1 The EMBRAPORT Port Terminal will be located in the Municipality of Santos, State of Sao Paulo, integrated into the Santos Port Complex on the northeast bank of the estuary in an area named Sitio Sandi located between the Sandi and Diana Rivers near Barnabe Island. The total area of the property destined for the Terminal is currently 101.9 hectares (ha), with planned expansion of the area via ocean landfill of 30.9 ha, increasing the total area to 132.8 ha. In this area, approximately 80 ha will be developed for the port space and approximately 50 ha will remain as a preservation area around the developed port space.
- 2.2 The property is located entirely within the Port and Retroport Use Zone (ZPR4) and partially within an area named Porto Organizado under the jurisdiction of the Companhia Docas do Estado de Sao Paulo (CODESP-former Santos Port Authority) linked to the Ministry of Transportation. The Project in the area was declared a “Public Utility” by Municipal Decree no. 3650, of 12/01/2000.
- 2.2 The land access will be via the existing CODESP Private Road (Companhia Docas do Estado de Sao Paulo – former Santos Port Company) to access Barnabe Island, which is interconnected to the Conego Domenico Rangoni Highway (SP-055). Railway access will be through a 220 meter branch to be built and connected to the Ramal Conceicaozinha, which crosses the area of the Embraport Port Terminal and is operational, and part of the MRS Logistica S.A. network. The sea access to the project will be via a channel of the Santos estuary and the maneuvering basin of the Port of Santos which will be expanded.
- 2.4 The nearest protected area to the Project is Parque Estadual da Serra do Mar (Serra do Mar State Reservation Park) located 2.4 km from the Project property boundaries. The Park was established in 1977 and is about 315,000 ha extending along the coastal mountain ridge of São Paulo State up to the Rio de Janeiro State border. It is the largest area of continuous preserved Atlantic rainforest, which, in the past had covered most of the Brazilian Northern to Southern coastal area. The remainder of the original forest is preserved in parks, reservations and conservation units / ecological stations. A great part of its vegetation is formed of secondary woods as a result of intense poaching activities which took place primarily large animal hunting and harvesting of palmito – palm heart. The Cubatão Administration Nucleus of the Serra do Mar Reservation Park is formed by 115 thousand hectares involving 15 municipalities of the São Paulo metropolitan region and the Baixada Santista region, part of the Santos micro region. Distances from Serra do Mar Reservation Park are: Santos city center – 2.0 km; EMBRAPORT Project - 2.4 km; Cubatão city center - 1.8 km; Cubatão industrial district – 0 km - on park border area.

### **B. Project Components**

- 2.5 The Project consists of a Port Terminal for multiple use with the basic purpose of moving containers, liquid bulk (ethanol), and general cargo under all customs regimes both for

import and domestic shipping and including coastal navigation. The estimated volume for the project involves 1.25 million TEUs (Twenty-foot Equivalent Units, 1 TEU = 1 container) and up to 2 million tons of ethanol per year with 850 vessel dockings per year. The planned project layout includes two docking berths along the quay for general cargo (mainly containers) and one in a pier for liquid bulk. The Phase I length of the docking quay is 650 meters with a 250 meter pier. The container storage area will be 206,900 m<sup>2</sup> and the liquid bulk storage area will be 29,300 m<sup>2</sup> with a total of six 10,000 m<sup>3</sup> tanks, resulting in a total storage capacity of 60,000 m<sup>3</sup>. The Project will also include an internal roadway system and truck waiting area with support area for drivers as well as an internal railway system with car loading/unloading facilities. The Port Terminal will also include facilities for administrative functions, support, customs processing as well as auxiliary infrastructure (water, sanitation, energy, etc.).

- 2.6 The Project will be divided into three areas. The North Area – Retro-area and Access to Terminal (Area 1) located in the flatter and dryer area, with required filling of approximately 3.5 m, is the terminal's entrance where truck loading and unloading areas will be constructed along with several buildings and gates. Area 1 will consist of 194,130 m<sup>2</sup> with 169,293 m<sup>2</sup> of usable area and 8.7 ha for future expansion. The Central Area – Railyard (Area 2) is the rail yard and will require filling similar to Area 1 with final level of 3.5 m. Area 2 will consist of 91,330 m<sup>2</sup> of which 75,159 m<sup>2</sup> is usable area. The South Area – Ethanol Facilities and Container Yard (Area 3) is where the storage tanks for liquid bulk and the facilities for handling and storage of containers will be constructed. Area 3 will be the largest usable area consisting of 517,540 m<sup>2</sup> with 342,800 m<sup>2</sup> of usable area. This area will be built partially on fill with 165,731 m<sup>2</sup> on embankment yard area and 41,483 m<sup>2</sup> on a structured slab yard area creating a large platform to be supported by floating piles.
- 2.7 The Project construction will include dredging of contaminated and non-contaminated material as well as backfilling and rock filling. The dredging will consist of approximately 580,000 m<sup>3</sup> of contaminated material that will be deposited in geotubes and used as landfill at the Confined Disposal Facility (CDF) located in Area 3 destined for the container yard and 3,620,000 m<sup>3</sup> of non-contaminated material to be disposed of in an existing designated ocean dumping site located off the coast. Area 3 will be surrounded by a dike and will be divided into four small areas by three smaller earth dike barriers. The backfilling and rockfilling will cover almost all of the terminal area, with an estimated total volume of 2,375,000 m<sup>3</sup> in Phase 1. The approximate quantities to be used in the different layers of the fill are: geotextile 683,000 m<sup>2</sup>, geo-grids 368,000 m<sup>2</sup>, rockfill for protection 74,000 m<sup>3</sup>, drainage bed 160,000 m<sup>3</sup>.

### **C. Project Schedule, Workforce and Cost**

- 2.8 The EMBRAPORT Project construction will be completed in two phases. The completion of Phase 1 of the Project is expected 34 months from the start of construction. The commercial operation at EMBRAPORT will begin in the twenty-fifth month. The planned implementation timeline for Phase 1 of the project includes the following three

stages for delivery of the retro-area for containers: Stage 1 an estimated 50,000 m<sup>2</sup> at 24 months; Stage 2 an estimated 70,000 m<sup>2</sup> at 29 months; and Stage 3 an estimated 211,305 m<sup>2</sup> at 34 months. The Phase 2 construction activities will be financed separately upon completion of further economic analysis.

- 2.9 The preparatory activities being conducted at the site include vegetation clearing and landfill activities using material from the rock quarry for which a total of 67 people are employed. During the construction phase, the Project is expected to employ a peak work force of 634 people during months 13 through 17. During the operational phase (after Phase 1), the Project is expected to employ over 1,000 workers.
- 2.10 Total project costs are estimated at approximately US\$1,020 million with a total long-term financing package of approximately US\$765 million. The financing will include a US\$430 million A/B Loan from the IDB consisting of US\$100 million from the Bank's own capital and US\$330 million B loan. In parallel, the Bank is partnering with *Caixa Economica Federal* (CEF) of Brazil for an additional US\$335 million (equivalent) in local currency, through an on-lending facility of BNDES, to complete the total long-term debt package.

#### **D. Analysis of Alternatives**

- 2.11 The site selection included an alternatives analysis as well as an assessment of environmental and social factors. The choice of the EMBRAPORT Port Terminal site resulted from a study of alternatives regarding the main functions to be performed by the Project and the site location from a regional and local standpoint. The aspects that influenced the decision regarding the site selection included an analysis of the needs and opportunities identified in the domestic market, adaptation to EMBRAPORT's objectives and strategic planning, funding requirements and sites availability for the Project. The conclusion of the functional alternatives and regional location analysis in the Environmental Impact Study indicated that the cargo terminal area location should be in an existing port area and the Santos Terminal area would be the most adequate. Within the scope of the environmental studies undertaken during the licensing phase of the future Terminal, detailed studies were conducted for occupying the area with criteria for minimizing environmental and social impact (specifically for the Diana Island). Of the two layout alternatives analyzed, the alternative selected included several positive environmental factors including reduction in impacts on flora and fauna, conservation of fishing activities, reduction in fill material, reduction in dredging required, etc..

### **3 INSTITUTIONAL AND LEGAL FRAMEWORK**

#### **A. Institutional Framework**

##### *Industrial Sector (Ports)*

- 3.1 The National Waterway Transportation Agency - ANTAQ, created by Law no. 10.233, of June 5, 2001, headquartered and with legal venue in the Federal District, corporate entity

of public law, subject to the special autarchy regime and linked to the Ministry of Transportation, has the responsibility for waterway transportation and is the port activity regulating agency. ANTAQ adopts the required measures for compliance with public interest and development of waterway transportation and port activities and exercises normative power in connection with the provision of transportation services and exploitation of port and waterway infrastructure, ensuring access and use as well as users rights, fostering competition among operators, and increasing the utilization of the existing infrastructure. ANTAQ assumes, under its administration, the instruments of authorization for exploitation of waterway and port infrastructure, and for the provision of waterway transportation services entered into during the effective period of Law no. 10.233, of 2001, while safeguarding the rights of the parties. ANTAQ also authorizes the construction and exploitation of private port terminals, of exclusive or mixed use, as provided for in Law no. 8,630, of 1993, and supervises their exploitation.

### *Environment*

- 3.2 The Ministry of Environment (MMA) is the highest-level body of the Executive responsible for formulation and revision of the National Environmental Policy pursuant to the principles and rights guaranteed by the 1988 Federal Constitution (Chapter VI).
- 3.3 Federal Law No 6.938 of August 31, 1981 that instituted the National Environmental Policy also created the National Environmental System (SISNAMA), and the National Environmental Council (CONAMA). As a consulting and deliberative body, the main duty of the latter is to formulate and approve Resolutions and other legal provisions related to preservation and environmental licensing in the whole country.
- 3.4 The Brazilian Institute for Environment and Renewable Resources (IBAMA), is the agency responsible for enforcing environmental laws and resolutions at the federal level, and for environmental licensing of projects or activities which either disturb environmentally sensitive areas protected by federal legislation (including Conservation Units), or which imply in impacts affecting country boundaries or the territory of more than one State.
- 3.5 The Office of the Public Prosecutor (MP) is a judicial entity operating at both federal and state levels. Environment-wise, it verifies environmental conduct and practices adopted by both public agencies and free enterprise. With the institutional responsibility for the defense of diffuse interests, the MP may investigate, propose Public Civil Actions, and file criminal proceedings against violators of existing environmental laws.

### *Health and Safety*

- 3.6 The Federal Constitution guarantees protection of the health and safety of employees in the workplace and in the performance of professional activities involving risk of life or accidents. The Ministry of Labor and Employment (MTE), through the Department of Occupational Health and Safety (SSMT), is the federal agency responsible for

standardization and inspection of worker • occupational health and safety measures established in federal laws or Regulatory Procedures (Normas Reguladoras).

- 3.7 Verification of compliance with health and safety laws and regulations along the country is the responsibility of the MTE Regional Offices (DRTs), as well as of the Internal Commissions for Accident Prevention (CIPAs), which must be created by the companies. Personal Protection Equipment (PPE) are approved by the National Occupational Health and Safety Department of the Ministry of Labor and Employment.
- 3.8 The National Social Security Institute (INSS) is responsible for formulation and enforcement of social security legislation.

### *Cultural Heritage*

- 3.9 The Institute for National Historic and Artistic Heritage (IPHAN) is the federal agency responsible for the protection of Brazil's historical, cultural, artistic, and archaeological heritage. IPHAN participates in the environmental licensing procedures of projects or activities that may damage cultural property. In cases of significant impact projects involving earth movement and/or excavation, IPHAN requires and supervises archaeological surveys, which must be concluded prior to project implementation.

## **B. Legal Framework**

### *Industrial Sector (Ports)*

- 3.10 Federal Law No. 8.630, February 25, 1993, the Port Law, which provides for the legal framework for the operation of organized ports and port facilities, defines Port Facility of Private Use as the facility explored by a corporate entity of public or private law, inside or outside the port area, used in the movement of passengers or movement or storage of goods, destined for or arising from waterway transportation (Wording given by Law No. 11.314/06).
- 3.11 Federal Decree No. 4.391/02 provides for the leasing of port facilities and areas, which is addressed in Law no. 8.630, of February 25, 1993, creates the National Program for Leasing of Port Facilities and Areas, sets forth the authority to carry out bidding procedures and execute the respective leasing agreements within the level of the organized port, among other provisions.
- 3.12 ANTAQ Resolution No. 517/05 defines port terminal of mixed private use as the facility, not an integral part of public ports assets, constructed or to be constructed by private company or public entity for movement or movement and storage of its own load, as well as third-party load, destined for or arising from waterway transportation. This Resolution also sets forth the standards for granting authorization for the construction, exploration and extension of port facilities of private use. The granted authorization is valid for the time the authorized private company remains in the industrial or commercial activity which has warranted the application for authorization. In case the private use terminal is

located in the organized port area, ANTAQ must consult the respective Port Authorities, which shall render a decision within the maximum period of thirty days, on the implementation of the terminal.

- 3.13 ANTAQ authorization for operation of a private use terminal, in case of cargo movement of oil and its derivatives, natural gas, as well as fuel alcohol, shall only be granted upon submittal of an authorization for operation issued by the National Petroleum Agency - ANP.
- 3.14 In the event of authorization for the construction and exploration of port terminal of private use, the start-up of operations depends on: prior inspection of the facilities by ANTAQ; submittal of report issued by the local Fire Department, as to the safety of the fire fighting facilities; submittal of the applicable environmental license issued by the competent federal or state agency.

#### *Environment*

- 3.15 EMBRAPORT's projects and facilities must comply with the terms of the legal instruments that establish environmental preservation requirements (defining areas and/or resources that must be preserved), pollutant emission restrictions (i.e. threshold limit values) and licensing procedures at the federal, state, and municipal levels. Legislation affecting these aspects is presented below, organized by issue.

#### *Environmental Licensing*

- 3.16 Federal Law No 6.938/81 (that created *SISNAMA*, *CONAMA*, and the National Environmental Policy) also established the master guidelines affecting environmental permitting procedures for projects with significant potential impact. Subsequently, Law No 6.938/81 was amended by Laws Nos. 7.804/89 and 8.028/90, and regulated by Decrees Nos. 99.274/90 and 3.942/01. Among the guidelines set forth in this legislation, a three stage licensing process is established, involving: Preliminary License (LP), Installation License (Construction License) (LI), and Operation License (LO).
- 3.17 The Preliminary License constitutes the main stage of the licensing process, during which the environmental feasibility of projects is established. Nevertheless, it does not suffice for the commencement of the project, which may only occur after issuance of the Installation License (Construction License), which is based on an analysis of more detailed engineering data and mitigation and/or compensation measures proposed. At the end of construction, the Operation License must be requested upon demonstration that all mitigating and compensatory measures proposed have actually been implemented.
- 3.18 CONAMA Resolution No 001/86 establishes that the licensing of activities with significant potential environmental impact will depend on the prior preparation and approval of an Environmental Impact Assessment (*Estudo de Impacto Ambiental* - EIA) and respective Environmental Impact Assessment Public Disclosure Report in accessible language (*Relatório de Impacto Ambiental* - RIMA).

- 3.19 CONAMA Resolution No 237/97 regulates aspects of the environmental licensing procedure, confirming the three-stage system. Articles 5 and 10 establish that local governments must confirm prior consent with projects and certify compatibility with local environmental and land use legislation. This Resolution furnishes a list of projects and activities subject to licensing through the three-stage procedure, and it includes port facilities.
- 3.20 In São Paulo, the State Environmental Agency (*Secretaria Estadual do Meio Ambiente*) has specific rules on licensing, which follow federal regulations. In 1997, the State Environmental Policy (*Política Estadual do Meio Ambiente*) was established (Law No 9.509/97), which was later regulated by State Decree No 47.400/02, which governs environmental licensing, establishes term of validity for each modality of license (Preliminary, Installation (Construction) and Operation), defines conditions for renewal, establishes periods for the analysis of applications and environmental licensing, institutes an obligatory notification procedure for suspension or shutdown of activities and defines charges for each type of analysis.

#### *Environmental Preservation*

- 3.21 The Forestry Code (*Código Florestal*), created through Federal Law No 4.771/65 defines the guidelines for preservation, clearing and exploration of forests and other forms of native vegetation, and also establishes the limits of areas deemed to be permanent preservation areas (*Áreas de Preservação Permanente* - APPs).
- 3.22 Subsequently, the Forestry Code was supplemented by a number of legal instruments, with highlight to the following:
- Provisional Decree No 2.166-67/01, which gives a new wording to articles 1, 4, 14, 16, and 44 and creates the requirement for IBAMA's prior consent in all cases of disturbance in permanent preservation areas. Furthermore, it increases the requirement for preserved "Legal Reserve" areas (*Reserva Legal*) in all rural properties.
  - CONAMA Resolution No 303/02, which details parameters and definitions for the establishment of boundaries of permanent preservation areas in general.
  - CONAMA Resolution No. 369/06 provides for special cases, of public and social interest, or low environmental impact, which enable the intervention or suppression of vegetation in Permanent Preservation Areas - APP. For example, works essential to the infrastructure destined for public services of transportation, sanitation and energy that are deemed to be of public interest.
- 3.23 Under the terms of the aforementioned legislation, all rural properties in the states of São Paulo are required to maintain forested "Legal Reserves" covering at least 20% of the property. Said "Legal Reserves" may not include permanent preservation areas. Compensation for insufficient "Legal Reserve" can take place in 3<sup>rd</sup> party properties, preferably within the same watershed, subject to approval by the responsible environmental authority.

- 3.24 Permanent preservation areas include margins of all rivers and streams (with minimum width of 30 meters on each side, increasing according to the width of the river), and the 50 meter radius surrounding springs. Furthermore, steep areas (over 45° slopes), cliffs and other fragile areas are also considered permanent preservation areas. On all such areas natural vegetation must be maintained (or restored) and only very limited impact interventions are allowed (i.e. property fences, drainage structures, water supply lines or similar). Whereas “Legal Reserve” requirements apply only on rural properties, permanent preservation area restrictions apply in urban areas as well and hence must be observed at the sites of industrial facilities.
- 3.25 Federal Law No 7.347/85 (amended by Laws Nos. 7.804/89 and 8.028/90) defines the Public Civil Action procedure in cases of damage to the environment, to consumers, or to the artistic, aesthetic, historic, cultural or landscape heritage. Federal Law No 9.605/97 defines environmental crimes, establishing the penal and administrative sanctions for conduct and activities harmful to the environment. Federal Decree No 3.179/99 regulates Law No 9.605/97 and defines the regime of fines applicable to each kind of environmental damage caused.
- 3.26 In the state of São Paulo, environmental preservation is governed by many different rules that regulate or complement federal legislation. Regarding the control of usage of water resources in São Paulo, the rules regulating the granting and discipline of water resource usage apply to EMBRAPORT’s activities. Law No 7.663/91 establishes the State Policy on Water Resources (*Política Estadual de Recursos Hídricos*) and the Integrated System of Water Resource Management (*Sistema Integrado de Gerenciamento de Recursos Hídricos*). Administrative Rule DAEE No 717/96 disciplines the use of surface and underground water resources in the state of São Paulo and Decree No 41.258/96 approved the regulation for granting of usage rights for water resources.

#### *Air Emission Standards*

- 3.27 Brazilian air quality standards exist for NO<sub>2</sub>, SO<sub>2</sub>, CO, O<sub>3</sub>, TSP (Total Suspended Particulate Matter) and PM<sub>10</sub> (Particulate Matter under 10µ). The currently applicable PM<sub>10</sub> Brazilian air quality standard (primary standard) is 50 µg/m<sup>3</sup> (annual average) and 150 µg/m<sup>3</sup> (24 hours), which is the same as the World Bank’s recommended standard. Where PM<sub>10</sub> measurements do not exist, the World Bank recommends a long-term (annual average) standard for TSP of 80 µg/m<sup>3</sup> (which is equivalent to the Brazilian annual TSP standard).
- 3.28 Other standards are the same as the World Bank standards with the exception of SO<sub>2</sub> and NO<sub>2</sub>. In the case of SO<sub>2</sub>, Brazilian and World Bank long-term (annual average) standard is the same (80 µg/m<sup>3</sup>). However the 24-hour World Bank standard is more stringent than the Brazilian standard (150 µg/m<sup>3</sup> vs. 365 µg/m<sup>3</sup>). A similar situation occurs with NO<sub>2</sub>. Long-term (annual average) standards are equivalent (100 µg/m<sup>3</sup>), but the World Bank’s 24-hour standard is more stringent than the Brazilian standard (150 µg/m<sup>3</sup> vs. 320 µg/m<sup>3</sup>).

- 3.29 Emission standards for stationary sources exist in Brazilian federal legislation only for TSP, NO<sub>x</sub> and SO<sub>2</sub> emissions resulting from external combustion equipment fuelled with coal or fuel oil. These are established in CONAMA Resolution No 382/06
- 3.30 In the state of São Paulo, the environmental quality standards are established by Law No 997, of May 31, 1976, which created the Environmental Pollution Prevention and Control System, which is regulated by State Decree No 8.468/76. Title III of this Decree covers Air Pollution: Chapter I presents the rules for the use and preservation of air and Chapter II covers quality standards and emissions for mobile and stationary sources.

#### *Liquid Effluent Discharges*

- 3.31 Regarding TLVs after treatment, Brazilian legislation establishes limits on 24 substances and/or parameters (CONAMA Resolution No 357/2005 – Article 34). The World Bank (PPAH) establishes TLVs, which are more stringent than CONAMA only in the cases of TSS, oil and grease, COD, Cadmium, Lead and Zinc.
- 3.32 CONAMA Resolution No. 398 of June 11, 2008 establishes the minimum content of the PEI – Individual Emergency Plan concerning oil pollution incidents in Brazilian waters, having originated from organized ports, port facilities, terminals, ducts, sounding devices, platforms and their supporting facilities, refineries, shipyards, marines, nautical clubs and similar facilities and provides guidelines for its elaboration.
- 3.33 In São Paulo, standards for effluent release are established by State Decree No 8.468/76. Title II covers water pollution. Chapter I covers the classification of water bodies and Chapter II covers water quality standards and release standards. The classification of water bodies according to use and quality follows Resolution CONAMA No 357/05 (Chapter II) and State Decree No 10.755/77 presents the classification of bodies of water in the state of São Paulo in the classes proposed by CONAMA. (Rivers Diana and Sandi are Class II).

#### *Solid Waste*

- 3.34 Brazilian federal legislation (NBR 10.004-2004) classifies wastes (solid and liquid) into three categories: Class I are dangerous wastes (including characteristics as: flammability, corrosivity, toxicity, reactivity and pathogenicity); Class II are nondangerous, subdivided in two: Class II-A - non-inert wastes (biodegradable, combustible or soluble in water); and Class II-B - inert wastes. Based on classification parameters, soils contaminated with oil or grease are generally Class I, as well as batteries, fluorescent lamps and any oil-contaminated material, including mineral or fuel oil, paint waste, solvents and other chemical products. Class I wastes require storage in specially designed containment cells and final destination such as: incineration, specific treatment or recycling. Class II wastes cannot be disposed of in uncontrolled manners and their disposal in landfill sites require specific authorization.
- 3.35 CONAMA Resolution No 313/2002 establishes the National Inventory of Industrial Waste (in solid, semi-solid, gaseous (contained) or liquid state, including sludge from

water treatment stations and pollution control equipment), requiring companies to prepare and submit detailed information on solid waste generation, characteristics, storage, transportation, treatment, reuse, recycling, recuperation and final disposal. Pending state-level regulations will establish which types of industrial activity will need to comply with this requirement.

- 3.36 CONAMA Resolution No 307/2002 states that construction debris (Class A), especially industrial construction debris, shall be properly disposed of in authorized landfills.
- 3.37 In São Paulo, in addition to federal legislation, the provisions of State Law N° 10.888/01 must be complied with. This Law governs the final disposal of potentially dangerous products of urban waste containing heavy metals. Furthermore, State Law N° 12.300/06 establishes the State Policy on Solid Waste and defines the principles and guidelines for the management, transport, storage and final disposal of solid wastes in the state.

### *Health & Safety*

- 3.38 The main legal instruments that govern the matter are federal, as follows:
- Law No 6.514/77, which amends Chapter V - Title II of the Consolidation of Labor Laws [CLT], related to Occupational Safety and Medicine;
  - Ministerial Ordinance MTE No 3.214/78, which approves the Regulatory Procedures (Normas Reguladoras - NRs) of Chapter V. Title II of CLT.

### *Cultural Heritage*

- 3.39 The major federal level legal instruments that govern the matter are the following:
- Federal Decree Law No 25/37, which organizes the protection of the National Artistic and Historic Heritage.
  - Decree Law No 4.146/42, which provides for the protection of fossil deposits.
  - Law No 3.924/61, which provides for the protection of archaeological and prehistoric monuments and includes complementary requirements (types of archaeological records, for example) related to surveys at archaeological sites, and establishes administrative procedures (authorizations, prior communications, and permits) to be issued exclusively by the relevant federal agency (IPHAN).
  - The Federal Constitution of 1988, which protects the archaeological and prehistoric sites and determines that sites discovered in the national territory must be object of scientific recovery conducted by qualified technical teams, pursuant to the standards set forth by IBPC . Brazilian Cultural Heritage Institute (Instituto Brasileiro de Patrimonio Cultural).
  - IPHAN (Institute for National Historic and Artistic Heritage) Directive No 07/88, which establishes the procedures necessary for the prior communication, permits and authorizations for archaeological excavations and surveys at archaeological sites.
  - IPHAN Directive No 230/02, which defines specific procedures to be met with regard to prior verification of archaeological remains during environmental licensing of projects that involve significant earth movement and/or excavation work.

## C. Project Compliance

### *Environmental Licensing*

- 3.40 The environmental licensing of the project started in 2000 at state level, with the filing of a Preliminary Environmental Report (.RAP) with the SMA. The SMA, after analysis of the RAP, requested a Working Plan for submittal of an Environmental Impact Study. EIA. The SMA issued Terms of Reference for the preparation of the EIA. The EIA was filed in the State of Sao Paulo Environmental Secretariat in October 2003.
- 3.41 The Terms of Reference for elaboration of the EIA/RIMA for EMBRAPORT Project was approved on June 24, 2002, as certified by Official Letter CPRN/DAIA/728/02, on June 24, 2002, and Technical Opinion CPRN/DAIA 260/02. In compliance with CONAMA Resolution 237/1997 the EIA/RIMA was submitted and approved by Santos Municipal Government Authorities according to Soil Occupation and Use Certificate no. 08, issued on May 23, 2003 and SEPLAN Technical Exam no. 60, issued on October 16, 2003.
- 3.42 Upon publication of the invitation for Public Hearing, scheduled for January 22 2004, a Public Civil Action was filed, with filing for injunction, so that the Port Terminal licensing would be within federal jurisdiction, to be reviewed by IBAMA. After intense legal discussion on the jurisdiction matter, IBAMA accepted the legal decision to assume the licensing of EMBRAPORT Project, receiving the EIA previously submitted to SMA.
- 3.43 In February 2005, a Public Hearing was held for the EMBRAPORT Project with no incidents.
- 3.44 After a review of the EIA and complementary documentation requested during the process, IBAMA issued a Preliminary License for the EMBRAPORT Project under no. 246/05, on June 01, 2005. EMBRAPORT filed an application for the Installation License on the basis of Reports of Compliance with the Conditions of the Preliminary License, and received on June 03, 2006 the Installation License authorizing the start-up of construction.

### *Compliance with Bank Policies*

- 3.45 The following IDB Safeguard Policies apply to EMBRAPORT Project:
- Disclosure of Information Policy (OP-102) applies to EMBRAPORT facilities. According to Brazilian regulations concerning the disclosure of information, the project requires media disclosure of the main events of the environmental permitting cycle (including issuance of the Preliminary License, the Installation License (Construction) and the Operation License) and public consultation through a Public Hearing of a detailed Environmental Impact Assessment (EIA). The Public Hearing is coordinated by the responsible environmental agency, which was IBAMA in this case, and is structured so as to present the project and the EIA results to the affected population and other stakeholders and to clarify any doubts and respond to

complaints, grievances and suggestions. A Public Hearing in Santos was held during the licensing process.

- The IDB's environmental and social due diligence activities have confirmed that the Project is in compliance with the applicable directives of the IDB Environmental and Safeguards Compliance Policy (OP-703) including the Environmental Impact Assessment (EIA) requirements of Directive B.5 and the consultation requirements of Directive B.6. There are provisions for Bank monitoring of compliance with all policy requirements according to Directive B.7. The Embraport project does not significantly convert or degrade critical natural sites or damage cultural sites as prescribed by Directive B.9 and there are no protected areas in the directly affected area. In addition, the site selected for Embraport is not considered an area highly suitable for biodiversity conservation, nor is it crucial for the survival of critically endangered, endangered, vulnerable or near threatened species listed on the IUCN Red List of Endangered Species. Nonetheless, the site is considered a natural habitat as per Directive B.9, and as such Embraport has agreed to, in consultation with IBAMA, to compensate for the habitat loss through preserving a mangrove site in a more pristine location. The waste management procedures are in compliance with Directive B.10. The ongoing construction including land clearing and landfill activities using material from the rock quarry is in compliance with Directive B.12.
- The IDB Policy on Involuntary Resettlement (OP-710) applies as there will be minor to moderate displacement of economic activities in local communities. The Project is in compliance with this policy through programs under implementation to address the economic impacts in the community.

3.46 The following IDB Safeguard Policies do not apply to EMBRAPORT Project:

- The Indigenous Peoples Policy (OP-765) does not apply as there is no presence of indigenous lands or populations in the immediate socioeconomic area of influence.
- Also, Santos region is not subject to earthquakes, hurricanes, volcanic eruptions, floods or droughts. Due to these conditions, the Natural and Unexpected Disasters Policy (OP-704) is not directly pertinent to the project.

#### *Hazardous Materials*

3.47 The detailed review concluded that risks associated to hazardous materials and associated management systems during construction were identified. The Environmental Programs described in Chapter 9 of the EIA for the operation phase details the activities to be adopted in relation to safety procedures of the future Terminal, with focus on the operations involving ethanol facilities. These programs are required by IBAMA for the issuance of the Operation License.

#### *Pollution Prevention and Abatement*

3.48 Future port activities will not be critical in terms of atmospheric emissions that are limited to vehicles and ships/boats. The project contemplates treatment of liquid effluents, (detailed design study is being developed and shall be submitted to IDB), including those generated during construction. Spill prevention and response is a major

issue and is the subject of detailed contingency plans and emergency response plans that will be reviewed during the detailing of the Environmental Programs for the Operation Phase.

### *Project Under Construction*

- 3.49 Construction on site has already started. Preliminary activities, including vegetation clearing, installation of jobsite facilities (canteen, administration office, but no onsite camp for workers as local commuters will be hired preferably from the Baixada Santista region), nursery for subsequent biological reinstatement, access road to the quarry and backfilling activities have already begun.

## **4 ENVIRONMENTAL AND SOCIAL SETTING**

### **A. Physical Environment**

- 4.1 The EMBRAPORT project is located in the Municipality of Santos, in the metropolitan area of the Baixada Santista (Santos Lowlands), central coastline of the State of São Paulo.
- 4.2 *Climate:* The Baixada Santista (Santos Lowlands) climate varies over the year, presenting temperature, air humidity and rainfall diversity. The Baixada Santista mean temperature is about 22°C (21.6°C in 2001), with February being the hottest month (mean of about 25°C) and July the coldest month (mean of about 18°C).
- 4.3 *Air Quality:* The air quality in the study area can be considered in compliance with air quality standards for all pollutants, except for ozone (O<sub>3</sub>), which frequently occurs at high concentrations, and for hydrocarbons when the prevailing winds blow from West.
- 4.4 *Noise:* Noise levels were calculated for the ADA (Directly Affected Area), by means of a noise survey. The first measurement point was located next to the project's access road, at the borderline, and the second point was located next to the railway bridge, close to the estuary, in front of the Santos Port. Noise from truck circulation was recorded at the first point, but this was not considered a significant noise level. At the second point, the prevailing noise sources are natural, consisting basically of noise produced by the wind in contact with the vegetation.
- 4.5 *Geology:* With regard to the geological setting into which the project is inserted, the Indirectly Affected Area (AID) occupies part of the northern portion of the Coastal Plain Itanhaém-Santos segment. To the north, it is limited by the Serra do Mar/Serra do Quilombo foothills, to the west, by the Canéu largo, and by the Quilombo and Onça rivers to the northwest. At its central part, draining direction is towards the Santa Rita Largo and Jurubatuba, Sandi and Diana Rivers, whereas the Bertioga Channel crosses the Plain at the SE portion. The southern area, including part of the towns of Santos, Vicente de Carvalho and Guarujá shows intense anthropic activity with the largest concentration of urban and economic activities. The Santos estuarine system, even under apparent

balance, reflects, in geological time, an intense silt-up process. Areas identified as shoals some decades ago – such as the north/northeast portion of the Bagres Island – currently covered by mangrove swamps, clearly show an expansion of tidal plain deposits, and are practically linked to the continent. The rock types that occur at the project ADA consist of quaternary sedimentary rocks.

- Holocene deposits associated to the Santos estuary: these are of great interest to the project and are characterized by the occurrence of shoals south of the mouth of the Sandi and Diana Rivers, next to the Ramal Conceiçãozinha Spur Rail, which suggest silt-up intensification due to the railway bridge fill, that extends to the south, on the west edge of the Bertioga Channel. According to the mapping carried out during the EIA, the placement of fill material on this area seems to prevent, at least partially, suspended sediments from flowing or from being bottom-entrained to other regions of the estuary or even to open sea. These sediments settle therein creating shoals and, as a consequence, mangrove vegetation gets installed, which will allow, in the future, tidal plains to develop.
- Fluvio-lacustrine and bay sediments (sands and clays): These sediments were mostly identified north of the Canéu and Santa Rita Largos, and of the Piaçaguêra (and Estuary) and Bertioga channels.
- Mangrove and swamp sediments (sands and clays): At the project AID, most land is occupied by deposits associated to tidal plains, created next to lagoon banks, in tidal channels and lower courses of rivers that drain the entire region at lower areas. In the ADA, the mangrove and swamp sediments consist of the main geological unit mapped in the EMBRAPORT Project area. They comprehend deposits of very fine clays and sands. The mangrove vegetation spreads sideways, which favors deposition of sediments around its roots. Mud bars that emerge during low tide are occupied by this vegetation and spread out sideways due to detritus build-up, originating a complex channel system that encircle small vegetated islets, which evolve until the formation of tidal plains.
- Shoals: Shoals represent areas of intense silt-up, mainly with fine sand deposits. The main occurrence was mapped on the west portion of the AID, next to the Canéu Largo. The extensions follow a north to south direction, close to the mouth of the Pedreira River, up to the Bagres Island. Other smaller shoal areas occur at the Barnabé Island seashore, next to the Santa Rita Largo and also at the south portion, reaching areas of the future project.

4.6 *Surface Dynamics:* With regard to the surface dynamics to which the project AID and ADA are subject at tidal Plains and Shoals that will be directly affected by the project, the existing interferences observed should be highlighted, such as: backfilling activities required for the construction of roadways and railways, and rectification of the Sandi riverbed. Within the project area, there are several situations of significant relief alteration. The project will cause new alterations that will affect the associated systems, both in already degraded island areas and in the area between the mouth of the Sandi and Diana Rivers. The most significant consequences derived from these interferences identified by the EIA are the following:

- Creation of a flooded area, free from tidal influence, between railway and roadway fills;

- Alteration of the morphology of the island where the EMBRAPORT Project is planned to be implemented caused by the railway fill, which enhanced the deposition and growth of the coastal shoal, currently covered by mangrove vegetation; and
- Alteration caused by placing fill material on plains, on the tidal circulation pattern, causing significant alteration to the local ecosystem.

4.7 *Geotechnical Characterization of the Project Area:* Subsoil sediments show variable thicknesses, with thick layers of SFL clays at the construction works of the Santo Amaro Island, Companhia Siderúrgica Paulista (Cosipa) and Itapema. Settlement resulting from fill placement is generally significant, varying from 44 to 108 cm in the face of the different consolidation characteristics and mechanisms. Considering the planned fill works, and predominance of subsoil clays and SFL - large thicknesses and SPT values sometimes equal to zero – high magnitude settlement events are likely, mainly at locations where fill layers are thicker. Based on test results to evaluate the clay strength (Standard Penetration Test-or SPT), and of size distribution, the marine clays are classified as:

- Mangrove clays, of recent deposition, showing zero SPT results;
- Fluvio-lacustrine sediment (SFL) clays, showing SPT values between zero and two blows. According to available bibliographic data, depending upon the deposition way of SFL clayey sediments, these may contain intercalations of other materials and, the sandier they are, the lower the compression factors and the higher the natural densities, and;
- Transitional Clays (AT), consisting of continental and marine soils deposited during Pleistocene, very over-consolidated and showing SPT values above 5.

4.8 *Hydrogeology:* The works conducted for hydrogeological characterization included a geophysical survey whose purpose was to evidence and delineate a possible Saline Wedge intruding the local aquifer to provide guidance to future projects concerning groundwater exploitation. The works consisted of five profiles perpendicular to the axis of the Bertioga Channel. In the two aquifer systems found, the local groundwater physicochemical results do not evidence the presence of anomalies possibly related to the presence of contaminants. The average pH of these waters remained within the normal range (6.9 to 7.3 pH), which is a slightly alkaline environment. At a mean temperature of 24°C, these waters feature high electrical conductivity (EC), with values reaching 50 mS/cm. Among the inorganic substances surveyed (metals), only lead results suggest some sort of contamination. The following lead concentration was detected in some samples: 0.023mg/l, 0.026 mg/l and 0.027 mg/l. These concentrations indicate contamination due to the fact that: a) these results are not compatible with the majority of samples, which did not register the presence of this element; and, b) they are above the Potability Limit of 0.01mg/l established by Edict 1469 of December 12, 2000 – Ministry of Health (health risk). Vanadium, copper and zinc were detected as traces. Manganese and aluminum grades show concentrations above the Potability Limit reported in Edict 1469, of December 29, 2000, Ministry of Health (organoleptic criteria), which is 0.1 and 0.2 mg/l, respectively. These concentrations are not associated with a potential contamination but rather to the brackish/salt characteristic of the water. Among the organic compounds determined, the presence of phenolic compounds was found (phenol

and methylphenol), as well as of a polyaromatic hydrocarbon (naphthalene). PCB traces were detected at the ADA south and north portions. The concentrations detected are very low, in the nanogram per liter range (PPT), and do not suggest local contamination due to anthropic action. Probably, these traces are connected to an overall background of these compounds. In short, the physicochemical results did not indicate the presence of anomalies possibly related to the presence of contaminants.

- 4.9 *Hydrodynamics, Transportation and Deposition of Sediments in the Direct Area of Influence of the Project - AID:* Based on the modeling carried out in the EIA for the diagnosis concerning hydrodynamics, transportation and deposition of sediments in channels, in association with in situ surveys of local currents, it has been verified that the AID waters suffers an “attack” of currents during the high tide period. This situation confers a specific characteristic to local hydrodynamics, which suggests the occurrence of erosive coastline processes and sedimentary deposition processes in the vicinities of the project area. Under a hydrodynamic point of view, the estuarine waters just south of the project area are the most energetic of the studied domain. The currents are relatively intense, since this coastal segment suffers frontal flow attack, channeled through the south portion of the Santos Channel. The conclusion is that the area directly affected by the project and surroundings is not too sensitive to inflow of sediments from the Diana and Sandi Rivers and to processes deriving from the Bertioga Channel inflow. Most cohesive and noncohesive sediments get trapped in the connection channels between the final reach of the rivers and the estuary. The suspended material concentration plume and the particulate material plume of larger grain size oscillate according to the tidal regime. Even considering extreme situations, with concentration of *supra-real* sediments, the study area remains unaffected by the sedimentary discharge processes derived from the rivers considered.
- 4.10 *Sediment and Soil Quality:* Samples were collected from the different areas that make up the ADA; 2 to 3m deep core samples were obtained, as well as organism samples representative of the estuary from the following locations: topsoil and surface sediment. The results obtained for sediment core samples indicate that cadmium and mercury were not detected and, therefore, meet the discharge criteria of materials dredged in marine environments. Amidst the values found for heavy metals in the ADA sediments, lead, copper, nickel and chromium values are slightly higher than Level 1 (which is the lowest level) considered in the CONAMA resolution proposal (pending approval) for the characterization of dredging material. Amidst all pollutants present in the sediments of the area to be dredged prior to the implementation of the EMBRAPORT Project, mercury, some PAHs and PCBs are those which pose higher risks to the aquatic biota. However, the presence of mercury is limited to the sediment surface (down to a depth of 10 cm); PAHs of concern were found just at the first core level (from 0 to 0.50 m) and locations showing the highest PCB concentrations were the last core level. The generalized presence of PAH in the sediments that were investigated in the EIA, as well as in other reviewed works on sediments of the Santos estuary, indicate an impact resulting from frequent spills of petroleum derivatives originating from vessels and industries, as well as due to the presence of these pollutants in liquid effluents, especially those originating from the petrochemical and steel industries. Total PCBs values are

slightly above Level 1 considered in the CONAMA resolution proposal for the characterization of dredging material. Therefore, the disposal of these sediments at the location where the material resulting from the dredging of the Santos port is discharged shall not produce toxicity levels that will cause significant impacts to the marine environment, as far as PCBs are concerned. The SVOC, PCB and Vanadium contents reflect the chronic impact on the Santos estuary due to petroleum and its derivatives, as well as residues generated during combustion of these compounds.

- 4.11 *Bottom Water Quality:* In a general way, the results of tests performed on samples collected from bottom waters indicated the absence of most contaminants. A high nickel concentration was verified in the estuary's bottom water. The existing data on this metal at the Santos estuary seems to be related to natural occurrences of the metal in Serra do Mar rocks. Nickel toxicity may vary significantly, depending upon the local physicochemical conditions, such as pH, temperature, salinity, among others. Apart from nickel, copper, manganese, zinc and arsenic were also detected, all of them below the quality level established by CONAMA Resolution No. 357, 2005. The contents of heavy metals and semi-volatile organic compounds in bottom water reflect the existing contamination in estuarine sediments and, except for nickel, do not represent significant impacts to the aquatic ecosystem. Nickel grades, at levels above the quality standards in all samples tested, are very close to the legal standard value. Furthermore, considering the fact that salinity contributes to reduce the toxic effect on aquatic organisms, its effects on the ecosystem should be reduced accordingly.

## **B. Biotic Environment**

### *Land and Regional Transitional Ecosystems*

- 4.12 The land and transitional ecosystems found in the influence areas of the Project belong to the Atlantic Rainforest domain, which occupies a significant area of the Brazilian territory, stretching from the seashore to inland. The ecosystems that cover the emerged portions of the Baixada Santista (Santos Lowlands) were grouped into three formations, according to the vegetation physiognomy: Atlantic Rainforest, *Restinga* Forest and Mangrove Swamps (SILVA et. al. 1993). A differentiated vegetal physiognomy called *apicum* occurs in the transition area between mangrove swamps and sandbanks where gradient is almost zero and also at some locations of the Baixada Santista (Santos Lowlands).
- 4.13 *Atlantic Rainforest:* The forests that occupy the hillsides show some aspects that contrast sharply with those of the coastal plain. This contrast is chiefly affected by the topographic variations, higher rainfall rate and air humidity. It is a high formation, with trees that reach up to 35m in height, where, due to the hilly relief, the tree tops do not form a continuous canopy, allowing sunlight penetration (FUNDAÇÃO SOS MATA ATLÂNTICA, 1991). Grasses barely occur. A high relative air humidity and good penetration of sunlight allow the development of an extensive epiphyte flora. In this group, undergrowth stand out (cryptogamae), Araceae (Phyllodendrum, Monstera), Bromeliaceae (Vriesea, Aechmaea, Nidularium, Tillandsia), Gesneriaceae (Codonanthe,

nematanthus) and Orchidaceae (Cattleya, Laelia, Oncidium, Brassavola) (FUNDAÇÃO SOS MATA ATLÂNTICA, 1991). Endemism level is quite high, i.e., 55% for arboreous species and 40% for families of non-arboreous species. This means that one out of two species found in the Atlantic Rainforest occurs specially in this formation. In case of palm trees and bromeliads, this percentage increases to two out of three species (FUNDAÇÃO SOS MATA ATLÂNTICA, 1991).

- 4.14 *Restinga Forest*: The coastal plain vegetation consists of species that are typical of the sandbank vegetation and species of forests that cover the Serra do Mar hillsides. This is a formation that occurs right after the area occupied by the dune vegetation or by mangrove swamps. It extends to the toe of the hill slopes, where it is replaced by hillside forests. Vegetation is dense, with trees reaching heights that vary from 10 to 15 m., with superimposed tree tops and a considerable richness of lianas and epiphytes. The *restinga* forests are characterized by a typical formation of sandy bars and terraces of the coastal plain. These are low forests, tree heights varying from 6 to 15m, with no defined stratification, with composition and structure varying as a function of the substratum content, salinity and depth of the phreatic level. Although tree tops contact each other, this is a bright forest, with very rich herbaceous stratum showing several bracken species and land orchids. The *restinga* forests, together with mangrove swamps, assure stability and quality to the drainage systems of coastal plains, containing sediments from the Serra do Mar scarps and preventing terrace erosion.
- 4.15 *Mangrove Swamps*: Mangrove swamps are a coastal ecosystem, representing the transition between land and aquatic environments, which is typical of tropical and subtropical regions and subject to the tidal regime. It consists of typical ligneous vegetal species, adapted to salinity fluctuations and to predominantly sludgy sediments, with low oxygen content. It occurs in coastal, sheltered regions, and provides suitable foraging, protective and mating conditions for many animal species, being considered an important source of goods and services. Mangrove swamps are generally associated to bay shores, coves, channels, river mouths, lagoons and coastal recesses, where river waters meet sea waters, or directly exposed to the coastline. Vegetal cover, in opposition to the situation on sandy beaches and dunes, gets installed on ooze substrata of recent formation, featuring low gradient, under the daily action of saltwater or brackish water tides. According to information of the EIA, the mangrove vegetal formation of the South-Southeast region, where the Baixada Santista (Santos Lowlands) are inserted into, consists of three genera and four species (*Rhizophora mangle*, *Avicennia schaueriana*, *A. germinans*, *Laguncularia racemosa*), apart from atypical elements such as *Conocarpus erecta*, *Hibiscus tiliaceus* and *Acrostichum aureum*. *Avicennia schaueriana* is predominant at most study stations assessed by CETESB (1988). Mangrove swamps are extremely important to keep the physical and biological estuary dynamics, stabilizing the drainage systems and sustaining a rich trophic chain. Their conservation is important to maintain the port activities due to the containment of sediments that silt up the channels, apart from assuring reproduction and growth of several organisms critical to the preservation of the fishing resources.

- 4.16 *Apicum*: The so called “apicum zone” or apicum in short, after BIGARELLA (1947), is part of the natural succession of mangrove swamps to other vegetal communities, and is the result of the deposition of fine sands during high tide hours. According to Schaeffer-Novelli, 1999, mangrove swamps and apicuns are found all over the coastline, from Cabo Orange (04°52’N) to Laguna (28°30’S). Apicum, also known as “salty”, occurs at the inner portion of mangrove swamps, at the medium/supra seashore interface, but rarely deep into the woods. Its limit is established by the average level of the equinoctial high tides (Maciel, 1991). It is characterized by a sunny zone of sandy soil, deprived of vegetal cover or that shelters vegetation which is predominantly herbaceous.

#### *Land and Regional Transitional Ecosystems*

- 4.17 The Sandi Island vegetation is a mosaic with the predominant vegetation cover that which is typical of mangrove swamps, at different levels of situations and compositions. This area still has portions covered by transitional vegetation, restinga vegetation at different stages and secondary vegetation. The North Area comprehends a large area between the Sandi and Diana Rivers and the access road to the CODESP terminal at the Barnabé Island. On this area there are mangrove swamps, restinga islets surrounded by apicum fields and areas with ruderal species along the CODESP road. The sandbar (restinga) areas are represented by isolated, round-shaped “islets”. The North Area is also similar to a mosaic. Vegetal cover typical of mangrove swamps stands out. This area still has portions covered by apicuns, restinga islets and few portions of secondary vegetation.
- 4.18 *Land Fauna*: With respect to the fauna of the project site, the field works verified the existence of 4 species, and 2 potential additional species of land mammals in the ADA: *Didelphis aurita* - opossum (tracks), *Procyon cancrivorus* –Raccoon (tracks), *Cavia fulgida* - *preá* (direct spotting), *Myocastor coypus* - *ratão-do-banhado* (burrows and a dead individual on the tracks) and *Rattus norvegicus* (tracks and direct spotting). Additional species were not likely, except for: *Holochilus brasiliensis* - *rato d’água* in the apicum fields that surround the restinga islets and *Lontra longicaudis* – river otter. Specific programs have been proposed with the purpose of monitoring these species.
- 4.19 *Birds*: Eighty bird species were found in the ADA, or less than 40% total figure detected in the mangrove complex and associated habitats. Twenty four species are aquatic birds or mangrove-dependent birds (such as *sebinho-do-mangue*, *Conirostrum bicolor*). There was no evidence of nesting places of aquatic birds in the ADA. Among the species found, the *Asa-de-telha* hawk stood out. The presence of this species on site can be explained by the abundance of *preás* and mice in the area that was filled to allow installing the railway and at the construction site of the road that will connect highway SP 055 to the Barnabé Island.
- 4.20 *Migrating aquatic birds*: The community of birds of the Santos-Cubatão mangrove complex shows an important migrating component. The migrating species include not only the well known curlews and *batuiras* that migrate from the Northern Hemisphere (Nearctic migrating species), but also species that perform altitudinal migrations and

migrations between the sea shore and inland hydrographic basins, which are part of the “intratropical migration” category. From a total of 210 species of birds recorded, 92 are considered resident species, 31 bear unknown status, 19 take on migrations of undetermined pattern, 14 are austral migrating species, 17 are Nearctic migrating species and 40 take on intratropical migrations.

- 4.21 *Herpetofauna (reptiles and amphibians)*: The salinity of mangrove waters is an obstacle to the existence of amphibians in such an environment. Mangrove swamps are also an effective barrier against colonization of the *restinga* islets by most species, even when there are fresh water puddles that would attract amphibians. Thus, this group is mostly found in fresh water marshes located at the mangrove-firm ground border. The only amphibian species spotted in the ADA vicinities was the *Leptodacylus cf. ocelatus* - frog, found next to the brackish water lake in between the railroad bed, the CODESP road and the dead arm of the Sandi River. This species, of large distribution and adaptability, has been recorded at the border of mangrove areas during low tides, while stalking *chamamaré* crabs (*Uca* sp). The *Tupinambis merianae* lizard was the only reptile recorded in the ADA, living in fill areas and appearing at very low density levels.
- 4.22 *Endangered, rare and/or endemic species*: Among the endangered species of the State of São Paulo (State Decree 42.839, February 1998), the following ones were found in the project AID and ADA:
- *Tartaruga-verde, Chelonia mydas*: Isolated green-turtles were observed twice in the ADA (23/9 and 25/10). The species is considered Vulnerable by the Ministry of the Environment and Endangered in São Paulo.
  - *Boto-cinza, Sotalia guianensis*: Estuarine dolphin occurrences reported by fishermen. The species (such as *Sotalia fluviatilis*) is considered as Probably Endangered in São Paulo.
  - *Mão-pelada, Procyon cancrivorus*: Tracks of this species (crab-eating raccoons) were frequently observed along the railroad bed and also in the mangrove forest. The species is considered as Probably Endangered in São Paulo.
  - *Marreca-toicinho, Anas bahamensis*: Teals were spotted coming from the west to land on the lake, similarly to other aggregation sites (Cascalho and Cubatão Rivers, Caneu Largo). The species is considered Vulnerable in São Paulo
  - *Trinta-réis real, Thalasseus maximus and Trinta-réis-de-bico-vermelho, Sterna hirundinacea*: The two species of birds that are considered endangered in the State of São Paulo are frequently spotted at the Santos Estuary, not far from the ADA; the site is used as a foraging area and the birds rest on the large sludge bank of the continental shore of the Caneu Largo.
  - *Guará-vermelho, Eudocimus ruber*: Isolated wolves or in groups of few individuals were recently spotted by chance along the Bertioga Channel and at the mouth of the Diana River, close to the ADA. The species is considered as Critically Endangered in São Paulo.
  - *Gavião-asa-de-telha, Parabuteo unicinctus*: Harris’s hawk - A family group consisting of an adult pair and at least an immature individual uses the railway bed as hunting ground, and were frequently spotted at the site at also flying over the Sandi

River. The small population and the destruction of its habitat caused the species to be considered Critically Endangered in São Paulo.

- *Águia-pescadora*, *Pandion haliaetus*: An eagle specimen was spotted at the mouth of the Diana River.

#### *Aquatic communities*

- 4.23 *Phytoplankton*: density is not very differentiated, and nanoplankton organisms prevail. *Zooplankton*: 48 taxa were sampled and Copepoda prevailed. During the cold season less taxa were observed, but abundance increased. Taxa that prevailed throughout the area were Cirripedia, Oikopleura dioica, Acartia tonsa and Oithona sp. nauplii. Low density values of Brachyura, Gastropoda and Bivalvia larvae and of fish eggs and larvae and of the number of taxa may indicate that the site is being affected by environmental degradation factors.
- 4.24 *Benthos*: There are descriptions of the benthonic fauna of the Bertioga Channel, São Vicente and Santos bay, and this fauna is neither abundant nor diversified. At the inner part of the bay there is, in general, less diversity of species, and poliquet, bivalve, fusiform, gastropod, and amphipod species are common, such as Capitella capitata, Nephys sp, Diopatra cuprea, Owenia, Ninoe brasiliensis, Chione cancelata, Strigilla carnaria, Laevicardium brasilianum, Anachis obesa and Heleobia australis, and Tiburonella viscana. During the ADA surveys, the following species were observed: Polychaeta, Cirripedia, Amphipoda, Caprella, Bivalvia, Decapoda, Brachyura, Gastropoda, Anomura, Platielmintes, Nemertidae, Nectonema and Nematoda. The study area shows a poor benthonic fauna, consisting mainly of nematodes and poliquets, which are typical of impacted or polluted regions.
- 4.25 *Fish*: The secondary data available indicate that at the Santos bay the fish communities were abundant, rich and diversified, with predominance of Sciaenidae and Carangidae. The ichthyofauna of the Cubatão River is used as an additional resource to the riparian populations. Among the fish families, the most abundant were Gerreidae, Ariidae, Mugilidae and Centropomidae, and the most representative were *caratinga* (Eugerres brasilianus), *parati* (Mugil curema) and *carapeba*. In the Piaçaguera Channel the fish fauna consisted basically of demersal fish, represented by the Sciaenidae family, which was the most abundant in number of species and Ariidae family, and by pelagic fish, represented by the Clupeidae family, corresponding to more than 86% of the total fish catch, both in quantity and weight. Among demersal fish, the following stood out: Cathorops sp (yellow catfish), Micropogonias furnieri (*corvina*) e Isopisthus parvipinnis (*tortinha*), and Pellona harroweri (silver sardine) among the pelagic fish. During the ADA surveys, few species were caught, with predominance of paratis and carapebas. The number of species was the same for the two seasons, but during the hot season the catch was almost twice as much the cold season. During the cold season, the spatial abundance homogeneity was higher as well as fish concentration in stations facing the channel during the hot season. No individual showed deformities, macroscopically-visible morphologic and/or morphometric alterations, erosions, ulcerations or atypical odors. Sportfishing and small-scale fishing are quite common activities in the study area, and the

most important resources are whiteshrimp, mussels, oysters, crabs, *paratis*, snook, pescadas and catfish; these resources are vital to the Diana Island community.

- 4.26 *Megafauna*: the Portunidae (crab) and Penaeidae (shrimp) megafauna families were represented by three species each, being *Callinectes danae* (crab) the most abundant and frequent, being most individuals female, many of them carrying eggs and mating (Giannini & Crispino, 2001).

### C. Socio-Economics

- 4.27 *Baixada Santista* is the third largest region in the State of São Paulo in terms of population. Its total population, of almost 1.5 million inhabitants, is almost urban as a whole (99.6%), with fewer than 6 thousand inhabitants living in the rural area. Located in the central area on the coast of the State of São Paulo, it is formed by the municipalities of Bertioga, Cubatão, Guarujá, Praia Grande, Mongaguá, Itanhaém, Peruíbe, Santos and São Vicente. Its resident population consists of 1,476,820 inhabitants (IBGE, 2000) and it is the third largest urban agglomeration in the State, after the metropolitan regions of São Paulo and Campinas. Historically speaking, it can be said that the development of the region has always been associated with its port activities and easy access to the capital and interior of the State. This logistically strategic position favored the installation of an industrial park of significant importance to the economy of the state and the country, with special emphasis on Cubatão petrochemical complex, which concentrates the main industries related to the heavy chemistry and oil byproducts, besides the steelmaking (Cosipa).
- 4.28 The municipality of Santos is divided into two parts: Insular and Continental, governed by specific legislations on soil use and occupation for each of the defined areas: Complementary Law no. 312, of November 24, 1998, provides for this issue in the insular area of the municipality of Santos, and Complementary Law no. 359, of November 23, 1999, in its continental area. Santos Continental Area borders the municipalities of Cubatão, Guarujá and Bertioga. On the top of Serra do Mar, it borders Santo André and Mogi das Cruzes. With 231.6 km<sup>2</sup>, it is almost six times larger than the insular part of the municipality and comprises a 150 km<sup>2</sup> Environmental Protection Area (part of the Serra do Mar Reservation Park). Main distances from Santos central area are: 1.5 km to EMBRAPORT Project; 2 km to Serra do Mar Reservation Park - (EMBRAPORT Project is at a 2.4 km distance from this Park) . Santos continental area is formed by the districts of Quilombo, Guarapa, Sítio das Neves, Trindade, Cabuçu, Caruara, Iriri, Monte Cabrão, Barnabé Island and Diana Island.
- 4.29 Santos Continental Area is basically formed by sand banks and swamps, with some discontinuous areas prone to human settlement, where there are small residential agglomerations and some mineral extraction and agricultural activities. In general, it presents an occupation structured by the axes of the Cônego Domenico Rangoni (Piaçaguera-Guarujá) and BR-101 Highways. Itatinga village, built in the beginning of the century for electric power generation for the Port of Santos, is also within the continental area, on the foot of the slope of Serra do Mar. The continental part comprises

some tourism attractions, such as waterfalls and an old mill, which are visited by tourists, particularly on the weekends.

- 4.30 Regarding human settlements, data from the Secretariat of Planning of Santos City Administration show that Monte Cabrão had 650 inhabitants, Diana Island had 205 and Caruara, the largest human settlement in that part, 3,500 inhabitants, in 2000. These three cores own municipal schools: the one in Caruara provides elementary/secondary and high school and the one in Monte Cabrão provided, up to 2002, elementary school teaching only and those interested students had to supplement their studies at schools in the district of Vicente de Carvalho. In addition to schools, basic health care is provided at the Family Health Unit on Diana Island and in the clinics in Monte Cabrão and Caruara. These units are coordinated by the Collective Health Coordinatorship (Cosac), belonging to the Municipal Health Secretariat. The clinics in Monte Cabrão and Caruara provide health care services from Monday to Friday, in the morning and in the afternoon. Related to these cores, originally formed by fishermen, Diana Island remains with a practically stable population, while Monte Cabrão presents a slow growth caused by occupation by the inflow of low-income population, usually dwellers' relatives from other regions of the country, particularly from the northeast.

#### *Use of Soil*

- 4.31 The Area Directly Affected (ADA) by the project does not have at present any human population, and is partly within the area of the Organized Port. It is, however, separated by the Sandi and Diana Rivers only, on Barnabé Island and Diana Island. Barnabé Island, which is part of the area of Santos Organized Port, was object of recent leases for construction of new Liquid Terminals, as previously seen in the item corresponding to the Direct Area of Influence of the project. On Diana Island, the anthropic occupation is due to prevalingly residential use, with presence of some institutional (school, health care unit, Community Center) and commercial (restaurants, bars) facilities, besides a private shrimp nursery. This nursery is intended for white shrimps, which are sold as baits to sports fishermen. Due to the large presence of swamps, the soil is not favorable to agriculture.
- 4.32 According to the Soil Use and Occupation Ordering Law for the Continental Area of the Municipality of Santos – Complementary Law no. 359, of November 25, 1999, the area where the project will be built is considered as Port and Port Facilities Zone, and the residence area in the community of Diana Island is considered as Urban Zone. The following uses are allowed in the Port and Port Facilities Zone: I – port and port facilities activities; II – technical and/or scientific projects and activities; III – infrastructure supporting the uses allowed; IV – small and medium nautical support structures; V – warehouses and non-pollutant industrial units; VI – highway and railway terminals, and VII – highway structure and transmission towers. The following uses are allowed in the Urban Zone: I – maintenance of traditional communities; II – entertainment ranches and small farms; III – sustained handling of flora and fauna species; IV – agriculture/cattle raising, aquaculture and mariculture; V – entertainment and tourism enterprises; VI – urban settlement, real estate development, and soil division; VII – public, institutional

and urban infrastructure facilities; VIII – commercial and service activities; IX – passengers’ highway and railway terminals; X – small and medium nautical support structures; and XI – highway structure and transmission towers.

- 4.33 The area where EMBRAPORT Project will be built has no human occupation. There are no residential settlements on Barnabé Island either. Sixty-five (65) families live on Diana Island, totaling 205 people. Out of these, 49 (24%) are younger than 14 years old and 21 (10.2%) are older than 60. It implies that most of the resident population is at a productive age. The population belongs to some family trunks, as evidenced by the last names of most of the families: Quirino, Souza, Alves, Hipólito, etc. A partial survey of the occupation of the families residing on the island and obtained from Diana Island Improvement Society reports that, out of 41 families, 24 are headed by fishermen, even though they carry out a parallel activity, such as “*embarcado*” (those who work on commercial boats), sailors, etc. There are nine retired men, out of which two keep on fishing.

#### *Regional and Local Economy*

- 4.34 There are few non-urban economic activities developed in *Baixada Santista*. The result is that the population is highly concentrated on the urban areas all over the region, resulting in a 99.6% regional urbanization rate. Guarujá and Praia Grande have had an urbanization rate of 100% since 1980. In 1991, also São Vicente tends to reach this figure. Cubatão and Santos have just around 0.5% of their population residing in rural areas. As a general rule, in highly urbanized regions – where the supply of jobs in commerce and services is very high, women’s percentage of the total population is higher than that of men. It is what happens in *Baixada Santista*, where 51.6% of the population consists of women. Among the municipalities considered in the Indirect Area of Influence - AII – in the Environmental Impact Assessment, only Cubatão, which concentrates industrial activities employing basically men labor, presents a slight predominance of men in its population: 50.3%. The afflux of floating population has a strong influence on the local economy, except in Cubatão, where the large industries prevail and tourism activity is practically inexistent. In the other municipalities of *Baixada Santista*, the tourism activities influence most of the local economies. Specifically Santos, which has little area for urban expansion, particularly in the surroundings of the coast, which is already totally occupied, is the coast municipality with the lowest floating population in AII.
- 4.35 Santos is the major job generator in *Baixada Santista*. In 2000, according to data provided by Empresa Paulista de Planejamento Metropolitano S.A. (Emplasa), the municipality was responsible for 49.9% of the total jobs in the region. These jobs were concentrated on the port activities and on the tertiary sector. The sector that contributes the most to the creation of formal jobs in *Baixada Santista* is that of services, responsible for 53.4% of the total jobs in the region. The municipality of Santos concentrates most of these jobs, followed by Guarujá and São Vicente. Commerce is the second sector that contributes the most to the creation of formal jobs in the region, which represented 19.6% of the total jobs in the region in 2000. The municipality of Santos concentrates most of

the commerce jobs, followed by São Vicente, Praia Grande and Guarujá. The jobs generated by industry account for 14.1% of the total jobs in the region, concentrated on Cubatão, with 46.4% of the total jobs in this sector. Data from PED (Employment and Unemployment Research in the City of Santos) indicated that the municipalities neighboring Santos generate few job opportunities, which makes their dwellers resort to the job vacancies in Santos, where job supply is higher. This situation explains the great daily movement of workers. Most of the people who reside in Santos work in the city itself (85%). This figure is inverted in the case of the municipalities of São Vicente, Praia Grande and Guarujá, whose vacancy/resident ratio is much lower than that in Santos.

- 4.36 Regarding the access to health care services, the municipalities in AII had 236 health care units belonging to SUS system - Brazilian Public Health System - out of which 221 were first-aid units and 15 were hospitals. Part of the first-aid units (83 units, or 37.6% of the total) consisted of public basic services (health care units and family health units), responsible for medical assistance at a primary level, that is, basic health care. Among the hospitals, only 4 (26.7%) belong to the public system. The distribution of resources intended for health, especially those of higher complexity (secondary and tertiary levels), is not performed homogeneously in the region assessed, concentrating particularly on the municipality of Santos, which owns 60% of the hospitals and 67.5% of the beds in the region.

#### *Transportation, Logistics, and Infrastructure*

- 4.37 Regionally speaking, the project area is served by the highways that comprise the Anchieta-Imigrantes Highway System, operated by the private concessionaire Ecovias, which interconnects with the *Planalto Paulista (Paulista Plateau, where the Greater São Paulo area is located)*, besides other highways that interconnect with other locations on the coast. It is also served by the railway systems operated by the companies América Latina Logística – ALL and MRS Logística S.A., besides the internal system to the Port of Santos operated by the company Portofer. Regarding the area to be occupied by the EMBRAPORT Project, known as *Sítio Sandi (Sandi site)*, it was unoccupied at the beginning of the terminal planning process. The area, however, was already crossed by the access road from CODESP to Barnabé Island, from SP-055 – Cônego Domenico Rangoni Highway (Piaçaguera-Guarujá), and by the railway line on the left bank of Santos Channel belonging to MRS system. Regarding the regional water transportation system, the main existent short-distance navigation system is a barge connection between Santos and Guarujá, administered by Desenvolvimento Rodoviário S.A. (DERSA). Besides this barge service, regular small- and medium-sized passenger boat lines operate in the estuary and on the sea coast carrying passengers between Santos and Guarujá, as well as serving districts, villages and locations such as Vicente de Carvalho, Pouca Farinha, Praia do Góes, Diana Island and Guarujá Air Base, among others.
- 4.38 In terms of air transportation, besides small airstrips or landing fields in Cubatão, São Vicente and Praia Grande, *Baixada Santista* only has a Military Airport belonging to Santos Air Base, located very close to the Terminal site. This Air Base shall start to operate as a regional commercial airport from 2009.

- 4.39 Regarding the anthropic occupation of the areas surrounding the future EMBRAPORT Project, on the same bank of the channel, there is the Fuel Terminal on Barnabé Island, on the west side, and a small fishermen community named Diana Island, to the east. Historically, Barnabé Island had a rural vocation, sheltering ruins of a former sugar cane or rice mill, probably dated from the 18<sup>th</sup> century. In 1911 the island became property of the municipality, and the City Administration leased it to *Clube de Regatas Vasco da Gama (sailing club)*, which used the island as an extension of its facilities on the beach. In 1913, the municipality sold the island to Cia. Docas de Santos (CDS), which later would change to Cia. Docas do Estado de São Paulo (CODESP). From 1920, CDS started to build a fuel terminal that opened in 1930. This terminal is considered a maximum safety terminal because of its fuel storage tanks.
- 4.40 The occupation standard in this community is similar to that of the initial occupation. As the only access to the location is by sea, with no circulation of vehicles, the houses were positioned facing the river, in the middle of plots of land surrounded by large free spaces. The houses built later had no planning: they defined the passageways, without planned street routes. The urbanized area has already occupied almost all the dry plots in the area, surrounded by humid swamps. The construction standard is simple, but very diversified because of the time of construction. Some of the oldest houses, made of wood, with a porch and basement and wooden doors and windows, represent a historical record of the construction standard from the beginning of last century. However, simple masonry constructions prevail. A water supply system is available, but there is no garbage collection and treatment of wastewater, which is discharged into Diana River. The electric power is supplied by a CODESP branch line, which crosses the channel and supplies the community. Dwellers pay a fixed price of R\$ 10,00/month, but the line is overloaded and the service is very poor, which is a reason for complaint by the dwellers.
- 4.41 At present, Barnabé Island is located within the limits of Santos Organized Port and has a complex for handling and storage of oil byproducts which main characteristics are:
- Operating companies: Granel Química e Brasterminais S.A.;
  - Number of mooring berths: 2 (10 m deep);
  - Highway access: access road to Barnabé Island;
  - Railway access: not available;
  - Access by ducts: two underwater ducts connected with Alemoa byproduct handling complex (right bank);
  - Movement in 2002: 84 moorings of vessels (average of one mooring every 4.3 days) – 674 thousand tons of products (oil byproducts).

#### *Cultural, Historical and Archaeological Assets*

- 4.42 Regarding Diana Island, according to information available, the occupation of the island by a fishermen community dates from 100 years ago, with a small core formed by four to five families. Later on, because of the expansion works of the former airstrip of Santos Air Base, approximately 20 families that lived on the plots of land occupied by the Air Base were resettled in the location. Fifty-eight (58) families live in the village at present,

all of them with strong blood ties with the pioneer families. A peculiar characteristic of the community, in view of its relative isolation by land and its history, is the fact that the community is responsible for the local growth control, since new constructions are only allowed for dwellers' children.

- 4.43 The community school provides teaching up to the 5<sup>th</sup> grade and there is a health care unit for basic medical aid. The oldest students attend the school located in the Air Base, which keeps an association with the community. For entertainment, the community has a soccer field, where regional championships are held, involving the several fishermen colonies of the estuary.
- 4.44 From the economic point of view, the main activity of the community is still associated with fishing and shellfish collection. However, interviews made with the Vice-President of the Dwellers Association evidenced the expectation to search for alternatives of formal work in the port activities, particularly in the new Terminal, for the community's youths. Another sector considered promising to allow job opportunities for the community members is the development of ecological tourism activities.
- 4.45 The attractions for the development of tourism include the annual Bom Jesus da Diana Island feast, started in 1942 and held every year on August 6 to 10, in devotion to the island patron saint. The peak of the feast is the mass celebrated in the chapel for this saint, followed by a procession on Diana River and exhibition of *Congada*. "*Comilança*" is also held in the feast. People who live in Santos attend this feast.
- 4.46 The municipalities of Santos, Guarujá, São Vicente and Cubatão comprise a territory that has a long history of human occupation, dating from at least 4,500 years ago. The oldest vestiges are related to different native Indian groups who developed in the region over the time, leaving a great variety and amount of physical vestiges (in the form of archaeological and historical sites), which are part of the present cultural assets of the region.
- 4.47 These assets have attracted growing attention from the public (federal, state and municipal) agencies, which have carried out several research, preservation and protection actions over the years. An example of that is the long list of cultural and natural assets that have been officially listed in the municipalities of AII.
- 4.48 The intense historical human settlement/occupation that occurred in the region of the Port of Santos resulted, in a large number of buildings and structures, some of them officially listed, others in process of being officially listed.
- 4.49 Regarding the construction area of the EMBRAPORT Project, surveys have defined the presence of a single site (Sandi site), of multicomponent nature: in the lower part it presents a narrow layer of occupation of prehistoric shell mound groups, probably a shell campsite; the upper part presents vestiges of historical occupation dating from the 19<sup>th</sup> century. Another shell mound site (Diana Island) was identified in the surroundings of the project area (inside AID), besides a historical and cultural context of *caiçara* (native)

occupation related to the formation of Diana Island itself, comprising rich assets that shall be affected by the implementation of the project (according to the provisions of article 5 of Iphan/MinC 230 Administrative Rule). At last, as the Environmental Impact Assessment indicated the potential to encounter archaeological vestiges during the construction works. The development and implementation of an archaeological research and rescue program was recommended throughout the project area.

## **5 ENVIRONMENTAL AND SOCIAL IMPACTS AND RISKS**

### **5.1 Construction Phase**

#### **A. Environment**

- 5.1.1 The principal negative environmental impacts associated with the construction of the Project are the deforestation of approximately 46 ha of coastal vegetation (*Mata Atlantica*), including mangrove forest and dry marsh brushes, and the consequent loss of waterfowl and other estuarine fauna habitat and the loss of fish and marine invertebrate population foraging and breeding grounds. The quantification of the impacts was based on the surface suppressed of each vegetal physiognomy, which is the best indicator of the extension of the ecosystems existing in the region.
- 5.1.2 The site selected for Embraport has been analyzed with respect to the impacts on natural habitats and cultural sites (application of directive B.9 of IDB policy OP-703). It has been determined that the project site is not a critical natural habitat; more specifically, the site is not an existing protected area nor is it a proposed protected area. The site is located in a region with high conservation value, the Atlantic forest and mangrove habitat; however, the project site is in a highly industrialized area with heavy ship traffic within a largely degraded regional ecosystem. Thus, the site location is not considered as an area highly suitable for biodiversity conservation, and nor is it crucial for the survival of critically endangered, endangered, vulnerable or near threatened species listed on the IUCN Red List of Endangered Species. Furthermore, it is not a nesting site for green turtles and the site is not inhabited by any endemic species. Finally, the site is not critical for the viability of migratory routes of migratory species. Nonetheless, the site is considered as a natural habitat (as per IDB policy OP-703 directive B.9), and as such Embraport has agreed, in consultation with IBAMA, to compensate for the loss of 46 ha of habitat by preserving a 270 ha mangrove site in a more pristine location within the same regional ecosystem.
- 5.1.3 The principal risk relates to the dredging of the access channel and evolution basin, the disposal of the dredged material, and to the use of potentially contaminated dredged material for the coastal landfill that will generate the re-suspension of contaminants which could accumulate in the aquatic fauna and/eventually reached population by the consumption of fish and mollusks and therefore affecting human health. These potential impacts will be further assessed and training will be conducted on human health related to aquatic fauna consumption.

- 5.1.4 The construction of the Project will generate the typical negative and short terms impacts on air quality and noise levels resulting from construction activities that will result in the generation of dust, emissions of vehicles, etc. The impacts on air quality and noise will derive primarily from the formation of dust from excavations and from the movement of machines and trucks at the construction site, and also from emissions from trucks that travel along the SP-055 highway. There is also the effect of the traffic of service vehicles close to the job site, which may generate a slight increase in air pollution. When dumping fill material the area is humidified to reduce dust pollution. However, given the small number of machines and equipment expected to operate on the site, this impact is temporary and of small magnitude, insufficient to cause significant alterations in air quality. Also during noise will be generated with the operation of machinery and equipment (e.g.; saws, stone crushers, pile hammers) and excavation and earthwork equipment, as well as with the emissions from traffic along the SP-055 highway.
- 5.1.5 *Suppression and reduction of biodiversity in shoal forests, sedges, and mangrove swamps:* The installation of the harbor terminal will cause the suppression of the shoal corresponding to 9% of the ADA, approximately 6% of the shoal vegetation existing in the AID and to less than 1% of the shoal vegetation existing in the AII. The sedge habitat will be suppressed in about 87% of its area within the ADA, with a significant impact also on the AID and AII. The significance of this impact is high, with a low mitigation potential. Therefore, it is necessary to take measures to assure the survival of animal species during the deforestation, and the conservation of the remaining sedges in the Northern Area of the project, protecting them from the effects on the surface dynamics produced by the earthfill. The mangrove swamp habitat will be suppressed in the ADA. The selected project layout for the harbor terminal avoids the suppression of the mangrove swamps at the Northern Area, where they are in excellent condition along the rivers Sandi and Diana. The construction works for the project and its supporting structure will be concentrated in the Southern Area, which is currently occupied with mangrove swamps degraded by past human activities and by erosion. With the partial occupation of the Northern Area by the project, a considerable portion of the mangrove swamps in good condition will be preserved, i.e., a lower percentage of the mangrove swamps of the Santos-Cubatão system will be eliminated. This will substantially reduce the significance of this impact, from High to Medium. This significance may be further reduced if alternative habitats are created, such as sludge banks in nearby locations (Compensation and Mitigation Measures), so as to minimize further, or even revert, the tendency to the decrease of the mangrove swamps area. The significance of this impact is medium, and may be reduced according to the scope and significance of the compensation and mitigation measures. However, the mitigation potential is low (rescue of plants and animals), and may become medium or high according to the scope and significance of the compensation and mitigation measures (creation of artificial sediment banks, recuperation of mangrove swamps and creation of a mangrove swamp preservation unit).
- 5.1.6. *Impacts on River and Estuarine Surface Water:* The contamination of water derives from the resuspension of sediments during dredging operations, which increases the concentration of particulate material in suspension and consequently the turbidity of the

water, facilitating the dissolution of contaminants aggregated to the particles of the sediment. The re-suspension of sediments occurs during dredging operations, both at the location where sediments are sucked by the dredger and from overflow from the dredger, and more intensely when the dredged material is contaminated. The contamination of the water by non-contaminated sediments occurs in terms of physicochemical parameters such as turbidity, total and sedimentable solids, and others. The significance of this impact varies from medium to high, in case of resuspension of contaminated sediments. Another impact that occurs on surface water derives from the contamination of the water by sanitary effluents that may occur during the construction phase through the sewerage of the job site. The project includes the collection and/or treatment of sanitary effluents, during construction phase, by means of the use of chemical toilets in remote work sites and the construction of an Effluent Treatment Plant for the central jobsite.

- 5.1.7 *Impacts on Underground Water:* The impacts on underground water during the installation phase of the project consist of the alteration of underground flows with the likely increase in water levels and decrease of the infiltration area; contamination of underground water, deriving from the proximity of the water table to the soil (a maximum depth of 1.0 m), and the installation of sewerage systems, maintenance yards, workshops and areas for the storage of hazardous materials. The project includes the collection and/or treatment of these types of contaminants, so as to prevent their infiltration into the soil. Another source of contamination of aquifers is the use of contaminated sediments and slag at the hydraulic fill to be made at the southern edge of the project area. This impact has a negative nature, it is direct, its magnitude varies from medium to high, its occurrence varies from probable to certain (in the case of remobilization of contaminants and infiltration of the aquifers at the base of the backfill), from short to medium term, it is temporary, reversible, and its significance is low.
- 5.1.8 *Impacts Related to Hydrodynamics, Transport and Settling in the ADA:* these impacts correspond to the alteration of hydrodynamics - current dynamics, and of the transport and disposal of sediments, deriving from the new configuration of the coastal line caused by the formation and advancement of the landfill onto the coastal line. Given the modifications made in the project during the EIA process, the final result will have a positive nature from the viewpoint of the erosion of the coastal line, with the approved lay-out protecting Barnabé Island coastal line.
- 5.1.9 *Impacts on the quality of the sediments:* the alteration of the quality of the sediments at the estuary and in the area for the disposal of dredged material derives from the re-suspension of sediments and the transfer of contaminated sediments to other locations, where they settle over non-contaminated sediments. This impact occurs at a lower intensity during dredging and at a higher intensity when the dredged material is disposed of, and it depends only on the quality of the dredged sediment, that is, on the level of contamination of the dredged sediment. The elimination of contaminated sediments from the estuary was considered a positive impact. The Confined Disposal Facility - CDF solution adopted by the project will mitigate this impact, adequately isolating the contaminated material.

## **B. Biotic Environment**

- 5.1.10 During the construction phase of the EMBRAPORT Project, the primary impacts are associated with the deforestation and suppression of segments of estuarine, inland, and transition ecosystems, and with the dredging of the access channel and evolution basin. The quantification of the impacts was based on the surface suppressed of each vegetal physiognomy, which is the best indicator of the extension of the ecosystems existing in the region.
- 5.1.11 *Suppression and reduction of biodiversity in shoal forests, sedges, and mangrove swamps:* The project will cause the suppression of these habitats. The installation of the harbor terminal will cause the suppression of the shoal corresponding to 9% of the Directly Affected Area (ADA), approximately 6% of the shoal vegetation existing in the Direct Area of Influence, (AID) and to less than 1% of the shoal vegetation existing in the Area of Indirect Influence. The sedge habitat will be suppressed in about 87% of its area within the ADA, with a significant impact also on the AID and AII. The significance of this impact is high, with a low mitigation potential. Therefore, it is necessary to take measures to assure the survival of animal species during the deforestation, and the conservation of the remaining sedges in the Northern Area of the project, protecting them from the effects on the surface dynamics produced by the earthfill. The mangrove swamp habitat will be suppressed in the ADA. The selected project layout for the harbor terminal avoids the suppression of the mangrove swamps at the Northern Area, where they are in excellent condition along the rivers Sandi and Diana. The construction works for the project and its supporting structure will be concentrated in the Southern Area, which is currently occupied with mangrove swamps degraded by past human activities and by erosion. With the partial occupation of the Northern Area by the project, a considerable portion of the mangrove swamps in good condition will be preserved, i.e., a lower percentage of the mangrove swamps of the Santos-Cubatão system will be eliminated. This will substantially reduce the significance of this impact, from High to Medium. This significance may be further reduced if alternative habitats are created, such as sludge banks in nearby locations (Compensation and Mitigation Measures), so as to minimize further, or even revert, the tendency to the decrease of the mangrove swamps area. The significance of this impact is medium, and may be reduced according to the scope and significance of the compensation and mitigation measures. However, the mitigation potential is low (rescue of plants and animals), and may become medium or high according to the scope and significance of the compensation and mitigation measures (creation of artificial sediment banks, recuperation of mangrove swamps and creation of a mangrove swamp preservation unit).

## **C. Social Impacts and Risks**

- 5.1.12 *Use of the soil and of the natural landscape:* the installation of the EMBRAPORT Project will cause the transformation of an area free of anthropic occupation, with its Northern portion in good preservation of its natural conditions, into a harbor and back harbor area. Part of this area - where the Terminal facilities will be installed - is destined for those uses by the law regulating the occupation and use of the soil of the continental portion of

the municipality of Santos, therefore there is no conflict with the legislation. The change of the local landscape to a constructed landscape will be felt negatively, particularly by the inhabitants of Diana Island and by the pleasure boats that travel through the river Diana. The preservation of the mangrove swamp in the northern area will significantly reduce the effects of this impact, since the southern portion has its natural conditions already deteriorated and a high degree of anthropic interference, due also to the presence of the railroad.

- 5.1.13 *The disturbance on the population residing near the job site* will exceed the levels of acoustic comfort during a significant part of the works. Therefore, in areas located at less than 700 m from dwellings, night activities shall be avoided. The central urban area of Santos is located at more than 1.5 km, and the main location with dwellings near the site is the fishing village on Diana Island, at approximately 300 m from the project, and consequently subjected to a noise level of up to 57 dB(A) during the construction phase. The noise impact during the construction phase may be considered of medium magnitude, localized, temporary, and reversible, and its area of influence is the residential zones neighboring the project. It is considered a highly significant impact if night operations occur in the area close to the dwellings. With the adoption of the mitigation measures, its significance will become low. As for the noise generated from the SP-055 highway, the significance of its impact is low, since it does not reach residential zones and it is generated during the day only.
- 5.1.14 *Installation of commercial and support service businesses for the truck drivers travelling along the CODESP access road to Barnabé Island:* The increased truck flow on the CODESP road may lead to the opening of commercial and support service businesses for the truck drivers travelling along that road, as well as low income dwellings. This impact was considered as being of medium significance.
- 5.1.15 *Unauthorized human occupation:* The project construction and operation may induce the occupation of Diana Island by a low income population in search of job opportunities (formal as well as informal). Small commercial businesses may also appear (bars, popular restaurants) to meet the needs of the workers, particularly during the construction phase. In addition, there might be a daily circulation of inhabitants of the island towards the project to work as informal traders. This impact was considered as being of medium significance, with a medium mitigation potential, and potentially reversible.
- 5.1.16 *Reduction in traditional and sport fishing activities:* The installation of the EMBRAPORT Project will occupy two distinct areas. The southern portion of the area intended for the project, close to Barnabé Island and to the Santos channel, where the railroad passes, has a rather deteriorated vegetation. Included in the project is the occupation of the central portion of the Northern Area. This portion is basically covered with shoal vegetation and sedge. The strip bordering the rivers Sandi and Diana, where the mangrove swamp is in good condition, will be preserved. Thus, the collection of shellfish, crabs, etc. in the mangrove swamp will not be significantly affected. Nevertheless, the siltation of channels and surface streams and the dredging activities may cause the destruction and/or reduction of the environmental conditions of sea life,

causing the reduction of fishing stocks in the proximity of Diana Island. The significance of this impact is medium, but mitigation is not possible.

- 5.1.17 *Contamination of Economically Important Species:* The contamination of economically important species of organisms residing in the submerged area directly affected by the project, with little or no mobility (crustaceans and mollusks), occurs with the incorporation of contaminants originating from the resuspension of the sediment during dredging activities and from the disposal of the dredged material and the possible solubilisation of contaminants in the water. In the long term, the exposure of these organisms, mainly fish, to the contamination, occurs also through the trophic chain. This impact is highly significant, but it is reversible.
- 5.1.18 *Impact on the Existing Archaeological Heritage:* During the licensing, EMBRAPORT performed extensive and detailed archeological and historical researches in the site, duly approved by IPHAN. The installation of the EMBRAPORT Project may compromise the archaeological heritage existing at the site (Sítio Sandi) due to the soil movements and the installation of the planned constructions. This action may cause a loss in the Brazilian cultural heritage, protected by federal law (Law No. 3924, 1988 Constitution). This potential impact was considered as being of high magnitude and high significance, considering the nature of the archaeological / historical heritage involved. However, it is mitigable through preventive actions.
- 5.1.19 *Impact on submerged archaeological vestiges:* The underwater actions planned for the installation and operation of the EMBRAPORT Project (dredging and landfills at the Santos estuary) may compromise the archaeological/historical heritage existing at that location, under the form of wrecked ships, submerged ports and support structures, and any sort of material vestige related to the centenary occupation of Santos as a national and international port. This impact was considered as being of high magnitude and high significance, considering the nature of the archaeological / historical heritage involved. However, it is mitigable through preventive actions.
- 5.1.20 *Increased risk of work-related accidents, occupational diseases and sexually transmitted diseases:* During the installation phase of the project, the recruitment of manpower and the implementation of the civil works may cause an increase in work-related accidents and occupational diseases among the hired manpower. Moreover, although the estimated number of jobs to be generated by the construction is 1100 at peak level of civil works, if a migration of workers occurs from other regions for the construction of this project, the dissemination of endemic diseases may occur, with a medium mitigation potential. Also, the expansion of the leisure segment for bachelors may increase the incidence of sexually transmitted diseases.

## 5.2 Operation Phase

### A. Physical Environment

- 5.2.1 *Air quality:* The impacts on air quality during the operation phase derive primarily from ships and harbor equipment, and emissions from the roadways that will access the harbor terminal. There is also the effect of the traffic of service vehicles in the surroundings of the job site, which may generate a slight increase in air pollution. Ships constitute a relatively high source of atmospheric emissions in absolute terms, but when related to their load capacity and to the tonnage they carry, their emissions are several times lower than that of trucks. Thus, the emission from the trucks used to bring and take out load from the port will be far higher than the emission from ships. According to the EIA findings, the atmospheric emission from ships is of low magnitude in comparison with the other sources present in the region, and does not have the potential to cause alterations in the current air pollution levels. Therefore, as the EIA considered this environmental impact as being of low magnitude, localized, permanent and of low significance, in view of its negligible intensity relatively to the current condition, no mitigation measure was proposed.
- 5.2.2 *Noise:* consideration was given to the impact caused during the operation phase by noise from ships, anchored as well as moving, noises emitted during harbor operations and noise from the traffic of vehicles transporting loads from the harbor terminal. Noise from anchored ships has low magnitude, and does not constitute a sound source with the potential to reach neighboring receivers. When ships move, the distance from the navigation course to the coast is long enough to attenuate the noise to the level of background noise. On the other hand, harbor operations, with the movement of cranes, tractors, forklifts, trucks, etc., generates a variable noise level, similar to the one described in relation to the construction phase, and the same remarks apply here. Therefore, the only sensitive point that will receive this sound load is the fishing village in Diana Island, when harbor operations are carried out at a distance smaller than 700 m from the island (during the night) and 400 m during the day. Therefore, the noise impact from harbor operations may be considered of medium magnitude and localized, its area of influence being the residential zones neighboring the project. It is considered a highly significant impact if night operations occur in the area close to the dwellings. With the adoption of the mitigation measures, its significance will become low.
- 5.2.3 *Superficial water:* during the operation phase, contamination will occur only in the event of direct discharge into bodies of water; and the contamination of water by diffuse sources, whose occurrence is probable during the installation phase and less probable during the operation phase of the project, due to the wastewater treatment plant to be built.
- 5.2.4 *Underground water:* For the operation phase, various sources of underground water contamination were identified and assessed, deriving from possible accidents during loading/unloading operations, transportation and storage of hazardous loads (chemicals and fuels - liquid bulk cargos). At the tank farm area and gas station there is also some

probability of contamination through infiltrations from spillages deriving from accidents during tank loading or due to the break up of a tank. Contamination may originate also from the maintenance yard and workshop, which may contaminate the aquifers if the effluents and solid waste they generate are not collected and treated.

- 5.2.5 *Impacts Related to Hydrodynamics, Transport and Settlement in the ADA:* these impacts correspond to the alteration of hydrodynamics - current dynamics, and of the transport and disposal of sediments, deriving from the new configuration of the coastal line caused by the formation and advancement of the landfill onto the coastal line. Therefore, this impact has a positive nature from the viewpoint of the erosion of the coastal line and the resuspension of sediments, an impact that derives from dredging activities.
- 5.2.6 *Impacts on the quality of the sediments:* the alteration of the quality of sediments in the estuary and in the area for the disposal of dredged material, deriving from the resuspension of sediments and transfer of contaminated sediments to other locations, where they deposit over non-contaminated sediments; and the elimination of the stock and source of contaminants from the sediments of the estuary, which corresponds to a positive impact.

## **B. Biotic Environment**

- 5.2.7 *Accidental contamination of the estuary with chemicals:* This impact will remain restricted to the operation phase of the project, during loading and unloading operations, when there is the possibility of the occurrence of accidents with boats or containers and packages. This impact has variable significance, according to the substance spilled out, the intensity of the spillage, the ecosystems affected, the equipment used and the means of access for the cleansing of the ecosystem. Nevertheless, its mitigation potential is high, provided that the preventive measures for risk management and emergency response contained in the Risk Management Plan (RMP) and in the Emergency Action Plans (EAP) are implemented.
- 5.2.8 *Chronic contamination of the estuary with liquid effluents and hydrocarbons:* The increase in boat traffic will increase the frequency of discharges of small amounts of hydrocarbons into the water (fuels, lubricants and solvents), thus increasing the local concentrations of polycyclic aromatic hydrocarbons. The significance of this impact is medium. However, it has a high mitigation potential, provided that measures are taken for workers' awareness and inspections are carried out.
- 5.2.9 *Proliferation of pest species:* The project includes the receipt and shipping of grains, sugar and other organic products that constitute food sources for synanthropic species (rats, pigeons, insects). Such species often proliferate in harbor areas, becoming plagues and causing public health problems (transmission of diseases) and environmental problems (generation of waste and odours). The significance of this impact is low, and its mitigation potential is high, provided that preventive control measures are implemented. These shall be part of the Environmental and Social Management System (SGAS).

- 5.2.10 *Impacts of Dredging Activities on the Biotic Environment:* The dredging activities are related to both construction and operation (maintenance dredging performed periodically) phases of the project, and they have a special significance when they involve contaminated sediments, as those of the Port of Santos. Dredging has a direct physical effect on the aquatic ecosystems and negative impacts on water quality, with consequences for the aquatic biota. The effects on the quality of the water and the sediment, especially those related to the contamination with chemical contaminants, are persistent.
- 5.2.11 *Reduction of photosynthetic rates due to the increase in water turbidity:* During dredging operations, as sediments are transported and discharged into the high sea, sediments are dispersed into the water column. The suspension of material in the water column may cause a reduction in the available luminous energy, and consequently a decrease of photosynthetic rates due to the increase in water turbidity. The proposal of a new layout for the project, with the advancement of harbor structures over the sheet of water of the estuary, meant a smaller volume of sediments to be dredged, thus decreasing the amount and duration of the suspended material. This impact has a low significance, and with the minimization of the overflow and of the resuspension of sediments during dredging operations, the impact may be virtually nullified.
- 5.2.12 *Elimination or alteration of local habitats and mortality of aquatic organisms:* The disintegration and suction of the sediments during a dredging operation cause the removal of individuals and the collapse of hiding places for benthonic organisms who live buried in the sediment. The mechanical energy employed is high, resulting in the destruction of the suctioned organisms, thus practically eliminating the benthonic organisms at the dredged location. The organisms that are not suctioned but are located near the plume formed by the resuspension of fine particles suffer the impact of the alterations of the physical and chemical characteristics of the water column. The deposition of the dredged sediments causes the burying and death of benthonic species, and this may be significant at the location for the disposal of dredged material. The significance of this impact is medium, with a low mitigation potential. The impact consisting of the death of organisms is not mitigable. Notwithstanding, the formation of sediment banks inside the estuary through the construction of fixed structures that will remain submerged will create a new environment that will be colonized by benthonic organisms from consolidated substrates, thus conferring a compensation for the elimination of organisms during dredging operations. During the disposal of the dredged material, the non-punctual discharge in situations with faster currents contributes to the dispersion of the sediment, thus minimizing the burying of benthonic species with clay blocks or large amounts of sand particles.
- 5.2.13 *Contamination of aquatic organisms:* The stirring and resuspension of the bottom sediments accelerate the dissolution and release processes of contaminants aggregated to sediment particles. The same occurs in the sea after the discharge of the dredged material. These contaminants, once released into the water column, come more easily into contact with aquatic organisms. In this process there may be some effect of acute toxicity on

more sensitive organisms, especially the planktonic ones, resulting in the death of some individuals.

- 5.2.14 *Reduction of the exposure of aquatic organisms to contaminants:* This is a positive impact, since the project will bring all contaminated sediments to the project landfill. The proposal of a new layout for the project, with the advancement of the structures to the inside of the estuary, resulted in the landfill of areas with contaminated sediments, and enabled the incorporation of the contaminated sediments into the body of the landfill, enabling its confinement.

### **C. Social Impacts and Risks**

- 5.2.15 *Alteration of the use of the soil and of the natural landscape:* The installation of the EMBRAPORT Project will cause the transformation of an area free of anthropic occupation, with its Northern portion in good preservation of its natural conditions, into a harbor and back harbor area. Part of this area - where the Terminal facilities will be installed - is destined for those uses by the law regulating the occupation and use of the soil of the continental portion of the municipality of Santos, therefore there is no conflict with the legislation. The change of the local landscape to a constructed landscape will be felt negatively, particularly by the inhabitants of Diana Island and by the pleasure boats that travel through the river Diana. The good preservation conditions of the mangrove swamp in the northern area will significantly reduce the effects of this impact, since the southern portion has its natural conditions already deteriorated and a high degree of anthropic interference, due also to the presence of the railroad.
- 5.2.16 *Impacts on Traditional and Sport Fishing:* During the operation phase of the project, there are risks of water contamination due to accidents such as the spillage of oil and other substances. This may reduce the fish stocks, including that of molluscs and crustaceans of commercial interest.
- 5.2.17 *Contamination of Economically Important Species:* The contamination of economically important species of organisms residing in the submerged area directly affected by the project, with little or no mobility (crustaceans and molluscs), occurs with the incorporation of contaminants originating from the resuspension of the sediment during dredging and from the disposal of the dredged material and the possible solubilization of contaminants in the water. In the long term, the exposure of these organisms, mainly fish, to the contamination, occurs also through the trophic chain.
- 5.2.18 *Economic Activity of the Municipalities of the AII:* The implementation of the EMBRAPORT Project will generate a fairly small number of jobs, and will be bound to the receipt and reship of cargos arriving from its wide Area of Economic Influence and from abroad. However, there will be an increment in activities performed by third parties related to pilotage, towage, cargo checking, scheduling of ocean and inland freight, customs processing, boat supply, as well as the delivery of products and services for the preservation and maintenance of the project (dredging, repairs on facilities, equipment maintenance and others). However, its impact on the economic dynamics of the

municipalities of the AII will be fairly small in this sense, since it will tend to remain limited to a small increment of the aggregate employment earnings and to a possible increment of the passage flow towards the port, with a small effect on commerce.

- 5.2.19 *Possibility of the occurrence of accidents:* The populations living in the surroundings of the harbor area are subject to the risk of accidents involving the spillage of oil and other polluting substances, as well as to the risk of fire. The operation of the new terminal will create a cumulative effect in relation to this accident risks, and due to the proximity, its effect will be strongest on the inhabitants of Diana Island. During the operation phase, there is potential for occurrence of work-related accidents and occupational diseases. Potential health and safety issues that harbor workers face include high noise levels, intoxication, and contamination with biological agents.
- 5.2.20 *Low Increase of the demand for health services:* It is expected that during the EMBRAPORT Project operation phase, 850 direct and 100 indirect jobs will be generated, mainly attracting Santos population. This population is already being served by the current health care structures, which implies in a low impact on these same structures.

#### **D. Cumulative Impacts**

- 5.2.21 Apart from the impacts on the logistics and transportation sector, the EIA considered the cumulative impacts related to the use of the harbor infrastructure and to the use of the inland transportation infrastructure to ship or remove cargos from the harbor terminals. The use of the harbor infrastructure would involve the access channel and the evolution basin of the port, in addition to launching cradles and facilities for the transshipment and processing of cargos on land. The use of the access channel and of the evolution basin would not have any restriction, even for a considerably higher ship traffic than the current one. The current annual number of dockings in the port is around four thousand, corresponding to eight thousand arrivals and departures per year through the channel and evolution basin, i.e., to less than one ships arrival or departure per hour, in average. A possible increment in the traffic of ships in the port would have to be supported by a corresponding increment in pilotage and tugboat services, which also would not have any restriction and could be beneficial in terms of efficiency, jobs generation and other aspects.
- 5.2.22 The use of launching cradles and harbor infrastructure on land for the transshipment and processing of cargos would depend on the availability and restrictions related to specific sites, in addition to the fact that they would not generate mutual cumulative impacts, since it would be carried out in different locations and facilities in the harbor area. The cumulative use of inland transportation infrastructure by different projects could generate traffic volumes higher than the currently available capacity. As for this aspect, the EIA considered the following:
- The SP-055 highway (Cônego Domenico Rangoni/Piaçaguera-Guarujá highway) has enough capacity to support satisfactorily a traffic volume of 53 thousand vehicles per day, including 7.5 thousand heavy vehicles (corresponding to 2.5 times the current traffic

volume), which, according to the assessment of the EIA, does not have more critical restrictions;

- The detour in km 248 of SP-55 (into the Rio-Santos highway, which would be used to turn back for certain truck trips related to the left bank terminals) has sufficient capacity to support satisfactorily a traffic volume of 4 thousand vehicles per day, including 600 heavy vehicles (corresponding to 4 times the current traffic volume), as shown in the diagnose. That intersection would possibly need a solution to support a higher traffic volume, involving the implementation of a device in different levels (cloverleaf), which would also be an improvement in the safety and comfort conditions for its users.
- The path down from the Serra do Mar (coastal mountain ridge) for heavy vehicles, through the use of only one lane of Via Anchieta (Anchieta Highway), could be another restriction, since it has the capacity to support satisfactorily an increment of only 29% of the current traffic of 13 thousand heavy vehicles per day (in both directions). Depending on the traffic increment to be generated, it may be necessary to increase the descent capacity for heavy vehicles, which may be done by using both lanes of Via Anchieta, in spite of the access problems that would be created for the "bairros-cota" ["boroughs-altitude", urban areas in the embankments of the Serra do Mar named after their altitude above sea level].
- It is worth noting that the terms for the concession of the Anchieta-Imigrantes Highway System determine that the highways must have a satisfactory service level (level D) at all times, except at most 50 hours per year (Call for Bids no. 015/CIC/97 – Allotment 22 - Anchieta/Imigrantes System - Appendix 7 - Services Corresponding to Enlargement Functions, item 2.2 - Criteria for Capacity Adjustment). Therefore, in case of an increased demand, the concessionaire of the system shall take the relevant measures to maintain the appropriate service level. Note that this provision applies to all the tracks mentioned above.

- 5.2.23 According to the EIA, the cumulative use of the inland transportation infrastructure by EMBRAPORT and future projects may be considered as a negative and high-magnitude impact only in relation to the path down from the Serra do Mar through the Via Anchieta. However, its significance is medium, since it may be mitigated through the adoption of measures to support the traffic through the Anchieta-Imigrantes System and through the accesses to the Baixada Santista (Santos Lowlands).

## **6 MANAGEMENT OF ENVIRONMENTAL AND SOCIAL IMPACTS AND RISKS**

### **6.1 Construction Phase**

- 6.1.1 A series of mitigation and environmental compensation measures were proposed for the impacts identified during the Environmental Impact Assessment, such to reduce the effects of the environmental and social impacts of the project during the implementation and operating phases. The adoption of these mitigating and compensatory measures was systematized by means of specific Environmental Programs, which are detailed in the EIA. The summary of all impacts assessed during the EIA identified that many of the impacts were considered small to moderate in magnitude and reversible, subject to mitigation through adequate measures of environmental control of construction works.

The following item describes the measures proposed, and some of them have already been implemented to the ongoing works.

*Mitigation and Monitoring of Impacts on Surface Water and Groundwater*

- 6.1.2 *Contamination by Sanitary Effluents:* preventive measures are being implemented during the construction phase of the project to prevent this impact, such as the use of chemical toilets in remote work fronts. To fulfill the sanitary demands of the main jobsite, a temporary Effluent Treatment Station – ETS was built to serve about 200 workers in the initial phase.
- 6.1.3 *Contamination by Effluents, Hazardous Consumables and Solid and Liquid Waste from Diffuse Sources:* the EIA proposed implementing preventive measures such as installation of waterproof floor, effluent collection (oil, grease and others) and treatment system and containment basins, adequate storage of fuel and other consumables, training of workers to prevent waste from being discharged and disposed of at locations other than those designated. Selective collection and waste recycling is being studied.
- 6.1.4 *Contamination by Leaching of Material Dredged in the Fill Area:* The material dredged from the channel where the port basin will be created was selected to be used as fill material in a portion of the embankment. Drillings carried out during the EIA verified the presence of contaminated material at the bottom of the channel, which will require segregation of this material through engineering techniques. The contaminated material will be sealed off by means of two geotubes. After the geotubes are filled up, a fill layer will be placed on top. Surface water quality is subject to the daily tidal variation, with increase and decrease of the system salinity. Likewise, tidal variations influence the concentration of eventual contaminants present in the water. Therefore, monthly monitoring of surface water quality should contemplate daily tidal variations to establish the collection times. Preferably, collection should take place during high tide, low tide and slack tide. The EIA recommends monthly monitoring of this analysis.

*Mitigation and Monitoring of Impacts on the Quality of Water and Sediments Associated to the Dredging Operation and Disposal of Dredged Material*

- 6.1.5 *Resuspension of Contaminated Sediments and Availability of Contaminants, in the ADA, during the Construction and Operation Phases:* According to EIA, placement of fill material in the area where contamination of surface sediment layers in the channel bed was diagnosed will result in future minimization of exposure of water and existing organisms to contaminants, in an area of about 309,000m<sup>2</sup>.
- 6.1.6 Due to the fact that contaminated sediments are found at the upper layer, which is more suitable to be used as fill material than the lower ones, its removal by dredging and disposal in geotubes correspond to the removal of the contamination source, by containment of the contaminated sediment, without transferring contamination to the ocean dumping area, where it could pose risks to the aquatic organisms.

- 6.1.7 *Sediment Resuspension in the Deep Sea Discharge Area, during the Installation and Operation Phases of the Project:* As stated in the EIA, the location alternative for disposal/discharge in the Santos deep sea waters is the one that is being used as discharge site of dredged material by CODESP. To follow up the impacts of the ocean disposals/discharge at this site, and aiming at their minimization, EMBRAPORT will join the monitoring program of discarded/discharged material, which will concentrate during the construction phase of the project. Some companies that provide services at the Santos Port are about to order an Environmental Impact Assessment concerning the use of a new dumpsite for the contaminated dredged material. EMBRAPORT will be part of this group.

*Mitigation and Monitoring of Impacts on Land, Aquatic and Transitional Ecosystems*

- 6.1.8 In relation to the local flora and fauna, EIA, through the Natural Resource Conservation program, proposed the following mitigating measures to be carried out prior to, during and after the installation phase of the project.
- 6.1.9 The rescue of epiphyte plants has been carried out since one year before the commencement of the vegetation suppression operation, by means of manual collection of specimens not taller than 4.0m, or with the use of instruments. Upon commencement of the vegetation suppression operation, as the trees are cut down, the other specimens will be collected. This measure applies to the entire implementation period of the project.
- 6.1.10 The genetic *restinga* material can be used in municipal plant nurseries or associations of forest replacement, so that these bodies manage their use as required. The collection and final destination of live material from areas to be deforested will be conducted by EMBRAPORT through subcontracting these services or agreements with universities, NGOs and research institutions. The EIA still considered agreements with local plant nurseries, duly registered for the 'Matrizes' project, prepared by Brazilian scientific entities. Currently, an agreement with the Municipal Administration of Santos is in force, through the Municipal Plant Nursery, which has been supplied with the genetic material from the vegetation suppression operation.
- 6.1.11 The banks will be formed with non-contaminated sludge dredged from the access channel and from the evolution basin of the future terminal, after removal of the upper layer (contaminated sediments) to create alternate habitats for aquatic organisms of the estuary. This material, as a function of its grain size and low contaminant content is ideal to the development of the benthonic organisms. The natural process of vegetal succession shall also allow future expansion of the mangrove swamps, in areas less subjected to flooding or areas that remain emerged over long periods.
- 6.1.12 Protection of estuarine ecosystems against potential risk of spillage of toxic or flammable products will be contemplated in the Risk Management Program of the project, to be prepared by EMBRAPORT, and to be developed based on an environmental sensitivity map of the area subject to spills, and also based on a modeling of the dispersion of the

contamination plumes. This activity will be responsibility of EMBRAPORT and will be implemented during the pre-implementation, implementation and operation stages.

- 6.1.13 The purpose of the Risk Management Plan and of the Individual Emergency Plan (PEI) is to identify potential incidents such as accidental spills of oils, fuels and hazardous materials; list the preventive and corrective measures to be adopted in the event of such situations. Some preventive and mitigating measures of impacts resulting from implementation and operation of the Port Terminal have already been incorporated into the project and into the construction processes.

## **6.2 Operation Phase**

- 6.2.1 *Settlements*: Depending upon the characteristics of the project and ground where it will be implemented (soft clays), settlements are likely to occur during the construction phase of the project, due to overload on the subsoil. The proposed mitigating measure consists of systematic inspection of fills during the operation to check for cracks and subsidence.
- 6.2.2 *Contamination by Sanitary Effluents*: The sanitary effluents of the port terminal will be conveyed to a sewage collection and treatment system during the operation phase of the project. Measures relative to ships effluents and waste, shall be defined in the near future and shall be part of the SGAS which shall be evaluated by IBAMA in order for EMBRAPORT Project to obtain the Operation License
- 6.2.3 *Contamination by Effluents and Solid and Liquid Wastes from Diffuse Sources*: The solid waste generated during the terminal operation will be classified according to standard ABNT NBR 10.004 and its volumes will be estimated to allow defining the collection, storage / treatment system and final destination. The waste will be taken to the outside of the mangrove area and will be disposed of on fills certified by the environmental body.
- 6.2.4 *Generation of Effluents from Diffuse Sources at the Terminal Units*: to prevent and control contamination of surface water and ground water due to leakage and seepage of chemical and combustible products, an isolated storage area will be provided, featuring reinforced concrete paving with no joints and highly impervious. A ditch will be constructed at the perimeter of this area to convey potential spills to the oil separator unit and to other tanks for treatment. Water released will be stored and analyzed prior to being released to the drainage system.
- 6.2.5 *Resuspension of Contaminated Sediments and Availability of Contaminants, in the ADA, during the Installation and Operation Phases of the Project*: Techniques that minimize sediment resuspension and prevent overflow will be employed during the operation phase, similarly to the precautions adopted during the installation phase.
- 6.2.6 *Sediment Resuspension in the Deep Sea Discharge Area, during the Installation Phase of the Project*: The precautions will be the same as those recommended for the Implementation Phase. However, during the operation phase of the project, just

maintenance dredging operations will be carried out, resulting in much lower volumes of sediments to be disposed of.

### **6.3 Construction and Operation Phase Environmental and Social Monitoring and Health and Safety Programs**

- 6.3.1 Most of the environmental programs start during the construction phase and extend throughout the project operation. The environmental programs aimed at grouping the measures, activities and actions related to mitigation, monitoring and control of impacts on the physical, biotic and socioeconomic media, as well as promoting an assessment of the efficiency of their application. They aimed at systematizing and creating mechanism to assess compliance with legal requirements, such as management of solid waste, quality control of hydric resources, effluent treatment and occupational health issues, among others.
- 6.3.2 The guidelines of the Risk Management Plan (PGR) are focused on risk analysis of incidents involving human lives, property and environmental resources (ecosystems, water and soil) inside and outside the Directly Affected Area of the project (ADA) and the Individual Emergency Plan (PEI), which aims at grouping guidelines of measures related to incident response, inside and outside the ADA.
- 6.3.3 The environmental monitoring programs include the following ten programs and plans:
1. Aquatic Biota Monitoring Program
  2. Fishing Support Program
  3. Environmental Quality Program
  4. Natural Resources Preservation Program
  5. Environmental Control Program – Construction Works
  6. Social Communication Program
  7. Sanitary Education and Occupational Health Program
  8. Archaeological Rescue Program
  9. Risk Management Plan (PGR)
  10. Individual Emergency Plan (PEI)
- 6.3.4 *Aquatic Biotic Monitoring Program:* The objective of this program is to assess the presence of contaminants in the aquatic biota through bioindicators that are representative of the estuary and of the food important to fishermen communities. Main activities considered in the Program: selection of bioindicators, collection of organisms, analysis of organisms (organic compounds, metals). The sampling frequency will be one prior to dredging, one during dredging and one after dredging completion. The program is active and started in June 2007 with an initial collection campaign performed next to the area of the future facilities of the EMBRAPORT Terminal. Three organisms (molluscs, fish and crustaceans) which were representative of the area as bioindicators of sediment contamination were collected. The purpose of the organism collection is to assess the quality of the aquatic biota previously to the dredging activities that will be carried out in the area. Fish, crustaceans and molluscs were collected and biometry was performed on them, i.e., classification of the maturation status and chemical analyses. The program is

active, and periodic reports are submitted to IBAMA for evaluation, and will keep active during the construction and operation stages.

- 6.3.5 *Fishing Support Program*: The program goals are: 1 – meet IBAMA’s LP No. 206/2005 requirement; 2 – commitment towards social responsibility, contributing to improve the quality of life of fishermen communities installed in the influence area. The Fishing Support Program started in November 2006, and will extend over the construction and operation phases of the terminal. Reports issued every six months are submitted to IBAMA.
- 6.3.6 *Environmental Quality Program*: The objective of the environmental quality program is to group the measures, activities and actions related to mitigation, monitoring and control of impacts on air quality, noise emission and quality of surface and groundwater. It is closely related to the Construction Work Environmental Control Program and with the Individual Emergency Plan and will be active throughout the construction work, including activities during the operation phase. The program is subdivided into plans, some of them interrelated, to know:
- Air Quality Control Plan: The objective is to minimize the suspension of particulate material during the installation phase of the project. The main activities, measures and/or actions comprehend keeping the soil humid by means of aspersion of treated water by a tank truck during excavation and transportation of material on unpaved roads.
  - Noise Emission Control Plan: The objective is to minimize noise emission during the installation and operation phases, in the ADA and close-by residential areas. Prior to the commencement of the works a campaign was carried out to measure the level of sound pressure at 4 (four) distinct points, which were selected due to exposure to factors that are emission sources (roads) or receiving sources (Diana Village). For better characterizing sound levels at the investigated points, the L90 was recorded, to produce the background noise. The sound levels recorded at the border of the project comply with the current legislation, NBR-10.151/200, included in CONAMA Resolution No. 01; 1990, being the area considered as industrial. According to the assessment performed by EMBRAPORT, at 20, 30, 50 and 100m, the levels were below 70 dB(A), maximum allowable limit according to the standard for daytime. It is worth emphasizing that the Diana Village would not be harmed by the sound levels that were measured, because at 50 and 100m the sound levels lie within the limits of the current legislation (70 dB(A) for day standard and 60 dB (A) for night standard).
- 6.3.7 *Natural Resource Preservation Programs*: The objective of this program is to minimize impacts to the fauna and flora due to project implementation and to maximize secondary benefits from the vegetation suppression operation utilizing this activity for scientific research and utilization of the biological resources removed.
- 6.3.8 *Construction Work Environmental Control Program*: The objective of this program is to define the investigation instruments and procedures required to the follow-up and control of impacts caused by the construction works during the installation and operation phases of the project, represented by runoff increase, triggering of erosive processes, silt-ups, runoff obstructions, slope ruptures and slope instability, settlement and failure of soft

soils in foundations, build-up of failed materials, loads on fills and preexisting structures, and negative friction on piles.

- 6.3.9 *Social Communication Program*: This Program selected as target-public the population living in the area of influence of the project, especially the Diana Island community. The program defines the required instruments and techniques such to allow providing to the population information and clarification on the project characteristics and impacts caused by the project, as well as on the technical and economically feasible solutions to mitigate them.
- 6.3.10 *Sanitary Education and Occupational Health Program*: Jobsite workers are the target-public of the program – permanent or temporary workers during the implementation and operation phases of the project, and the key objectives are:
- Reduce the risk of occupational incidents and diseases.
  - Reduce the risk of occurrence / proliferation of sexually transmitted or vectorborne diseases.
  - Provide guidance on the cares required to prevent sanitary actions that are harmful to the health and environment from being developed at the jobsite and campsite, as well as the operating terminal.
- 6.3.11 *Research and Rescue Program of the Archaeological, Historical and Cultural Heritage*: the purpose of this EMBRAPORT Terminal Program was to mitigate impacts to the archaeological heritage identified in the ADA and AID through research development, documentation and previous rescue of the archaeological heritage of the Sandi Site; detailing of researches in the AID (Diana Island); development of a underwater exploration program in the Santos Estuary (fill and dredging areas).
- 6.3.12 *Historical / Cultural Program - Diana Island*: This program is inserted into the Research and Rescue Program of the Archaeological, Historical and Cultural Heritage and intends to rescue the history of the *caiçara* (native inhabitant and descendants) occupation on the Diana Island, as well as to register its current occupation pattern, in material and immaterial terms, contemplating bibliographic and document researches, studies on material culture (building heritage and collections of material) and; survey and systematic recording of immaterial culture with the Diana Island community. The works related to publicizing activities of the historical and cultural program of the Diana Island are in progress.
- 6.3.13 *Risk Management Plan (PGR)*: The objective of the PGR is to provide a methodology for the establishment of requirements containing general management guidelines concerning the prevention, reduction and control of risks intrinsic to the implementation and operation phase of the project, aiming at human and environment protection.
- 6.3.14 *Individual Emergency Plan (PEI)*: The purpose of the PEI is to provide a set of information that will be used during the Construction Phase of the EMBRAPORT Project, aiming at the adoption of technical and administrative procedures to be adopted in emergency situations that might compromise the environment, health and safety of

contractor(s) workers and neighboring community. During the construction phase, the emergency situations may be associated to construction activities at the Terminal site and to road and/or sea transportation of oil from its shipping point to final consumption at the jobsite.

- 6.3.15 The activities and procedures related to Occupational Safety and Health were contemplated in the *Sanitary Education and Occupational Health Program*. The objective of this program is to prevent deterioration of the health condition of workers at the Port Terminal, and is based on Public Policies, mainly by adopting the principles stated in the Occupational Health Operating Standard NOST-SUS edit MS No. 3.908/98), complemented by Regulatory Standards (NRs) concerning Occupational Safety and Health, CONAMA Resolutions and ANVISA (National Agency of Sanitary Surveillance). The prime purpose of the program is to guide EMBRAPORT and contractor collaborators with respect to individual and collective preventive measures in relation to diseases, environment and work organization, as well as to incident prevention and aggressions to the environment. The program is active and started during the construction phase, and will be also applied to the operation phase. The program includes a series of training courses to the workers. The plan actions are also being incorporated into the Daily Safety Talk – DDS.
- 6.3.16 *Increase of the demand for health services:* A clinic will be implemented next to the jobsite, for first aid and emergency services, routine consultations, dental services, immunizations, collection and forwarding of material for laboratory tests, supply of medicine and directing patients to the regional health system. The implementation of this measure is a contractor responsibility, during the implementation phase and an EMBRAPORT responsibility, during the operation phase.
- 6.3.17 *Likelihood of occurrence of incidents:* EMBRAPORT will count on a Specific Emergency Control Plan (PCE) in conformance with the dispositions of Standard NR-29 and Law No. 9.966/00. Additionally, a Commitment Agreement will be executed with CODESP, by affiliating to the Mutual Assistance Plan (PAM), and by committing itself to present itself to the accident location with minimum resources and, if required, with additional resources, whenever requested by the PAM Coordination or by the Fire Brigade.
- 6.3.18 *Environmental, Health and Safety Management System:* EMBRAPORT will develop an Environmental Management System - SGA, taking into account the principles and requirements of standard ISO 14001, implementing a set of managerial instruments that assure efficient actions to deal with environmental issues, in compliance with the Company's Environmental Policy.

## **7 PUBLIC CONSULTATION**

All procedures established in the federal and state legislation relative to public consultation regarding environmental licensing were met by EMBRAPORT.

- 7.1 A Public Hearing was held in Santos on February 15, 2005 to present the EMBRAPORT project. In compliance with the environmental licensing standardization, the notice of Public Hearing was duly publicized on local and regional newspapers and through radio transmissions in the town of Santos.
- 7.2 Administrations of the municipality of Santos and of the neighboring municipality of Guarujá were asked about the project, in accordance with Brazilian environmental legislation, and they were in favor of the project.
- 7.3 With respect to the existing Diana Island community, which is located next to the project, EMBRAPORT has been developing activities to support this community, including slope protection of channel banks, channelfront landscaping, hiring of local labor to develop activities of rescue of vegetal species during vegetation suppression, among others. The interviews conducted onsite during the visit evidenced the existence of a proactive relationship between the community and EMBRAPORT.
- 7.4 In compliance with the environmental licensing recommendations, EMBRAPORT stays in contact with the Baixada Santista Fishermen Federation, aiming at the identification of opportunities and joint actions to support active fishermen. EMBRAPORT supports office equipment supply to the Federation and professionalization projects aimed at the new generations of families who rely on traditional fishing techniques for making a living, with the purpose of providing them with the means to search for better opportunities in the port labor market.
- 7.5 As an example of such initiatives with the community of traditional fishermen, it is worth mentioning EMBRAPORT's sponsorship since July 2007 to the Martim Pescador Newspaper, a 3000-issue monthly edition distributed to the fishermen. EMBRAPORT has three columns on this paper, where it informs on the progress of environmental and social programs implemented during the initial Port Terminal construction works.
- 7.6 As a supplementary action to divulge and improve communications with the internal and external publics, a toll-free service is being developed for frequently asked questions, requests, and suggestions, complaints and praises, and a page on the project is being maintained on the COIMEX Group website.
- 7.7 A Public Consultation was held on December 11, 2009, to present the new corporate structure and the status of the EMBRAPORT Port Terminal. 56 people participated in this consultation, including representatives of the Environmental and Port of Santos Affairs Secretariat, and representatives from the Fishing Federation of São Paulo State and the Fishing Villages, among others.

- 7.8 Since 2004 EMBRAPORT has communicated with the Fishing Federation and with the four fishing villages belonging to this federation considered directly or indirectly affected by the development (Vicente de Carvalho, Diana Island, Vila dos Pescadores, and Monte Cabrão). The first contacts with the community consisted of visits and support of classes and contracting of manual labor from residents of Diana Island. In 2006, EMBRAPORT initiated development of the Fishing Support Program and Social Communication Program. The communication activities of EMBRAPORT also include general society, such as public organizations, scientific communities and other organizations (CPFL, CODESP).
- 7.9 Since 2009 the actions to improve living conditions in the Diana Island community have been developed with the Municipal Government of Santos as intermediary. The priority for resource demands for Diana Island is determined through participatory meetings with the community in conjunction with a representative from the Municipal Government of Santos. EMBRAPORT's actions always have the approval of municipal authorities and are limited to the forwarding of requirements, and to supporting specific legally constituted projects.
- 7.10 Society's requests were discussed during several meetings held between community representatives (Diana Island community, Fishermen Colonies, teachers, etc.) and with municipal authorities (municipal representatives, municipal secretaries) and other organizations (CPFL, CODESP, São Paulo Fishing Institute).
- 7.11 Within the Support of Traditional Fishing Program, EMBRAPORT has developed activities to improve the activities of fishermen by offering training courses, to incentivize complementary income generation by offering craft workshops to the families of fishermen, supporting traditional festivals, and donating materials and equipment to improve community infrastructure.
- 7.12 The workshops and courses held within the scope of the Fishermen Support Program relied on the partnership established with renowned national entities, among them SENAI and the São Paulo State Port Authority, together with the fishermen communities. The professional courses reached about 522 students, including courses on navigation activities, boat engine basic maintenance, brick-laying, professional fishing, fish quality, fishermen health, maintenance of basic aluminum motorboats, and waterway classes, among others. Regarding craft workshops offered to the families of fishermen, 206 handicraft classes have been held since 2006, and in 2010, 78 workshops are planned.
- 7.13 The main activity related to communication consists of meetings with the neighboring communities, representatives of the Fishermen Colonies and the Fishermen Federation of the State of São Paulo.
- 7.14 As commented in the ESDD, the monthly publishing of "EMBRAPORT Column" ("Coluna EMBRAPORT") in the *Martim-Pescador* newspaper was one of the solutions found by EMBRAPORT in order to periodically inform about the main events of each stage of the Terminal's implementation. The column also allowed the consolidation of a

direct communication channel with the fishermen communities. *Martim-Pescador* newspaper is also available at EMBRAPORT's office and jobsite. The newspaper issues are also sent by mail to Fishermen Colonies in Baixada Santista and in the State of São Paulo (with 21 Colonies), the Diana Island community, the Fishing Federation, and other interested parties. This material can also be publicized by the Press Consultant hired by EMBRAPORT. In addition, an electronic version of the newspaper is also available at [www.jornalmartimpescador.com.br](http://www.jornalmartimpescador.com.br). EMBRAPORT also has a communication channel via email, called *Fale Conosco (Talk to Us)*, to receive complaints, suggestions, concerns, and other comments from the public. *Fale Conosco* is published in the *Martim-Pescador* newspaper. The Santos local media and the Baixada Santista regional media play a very relevant role in informing about EMBRAPORT's Project. EMBRAPORT also keeps a photographic file, documenting its actions, within the community relationship, environmental preservation and commercial interest areas. Some of the strategic media for divulging EMBRAPORT's image are: two newspapers headquartered in Santos, *A Tribuna*, particularly the Port & Sea editorial (Porto & Mar), and, *Jornal da Orla*, apart from the site Port People (Porto Gente) and the official communication newspaper of the Fishermen Colony Z-23 of Bertioga, *Martim-Pescador*.

## 8 REQUIREMENTS

The environmental and social requirements to be included in the loan agreement include the following:

- 8.1 The Bank (IDB) will require that Embraport and all portions of the Operation shall, at all times during the life of the loan, comply with each of the following:
  - a. All applicable environmental, social, health and safety, and labor regulatory requirements of Brazil.
  - b. All requirements associated with any environmental, social, health and safety, and labor related permits, authorizations, or licenses that apply to the Operation, the Sponsor/Borrower or any party responsible for executing the operation or its mitigation measures.
  - c. All environmental, social, health and safety, and labor requirements of the Operation contracts and any subsequent modifications.
  - d. All aspects and components of all of the Operation's environmental, health and safety, social and labor documents.
  - e. Applicable aspects of the International Finance Corporation (IFC) Environmental, Health and Safety Guidelines for Ports, Harbors and Terminals (2007), IFC Social and Environmental Sustainability Performance Standards (2006), and IFC Environmental, Health and Safety General Guidelines (2007).
  - f. Consult with IDB before approving or implementing any and all substantive changes to the Operation (including its environmental and social management and mitigation plans) or its timetable which could potentially have negative environmental, social, labor, or health and safety effects.

- g. Send written notice of any and all noncompliance with any environmental, health and safety, social and labor requirement of the loan agreement and any significant environmental, social, labor, health and safety accident, impact, event, claim or material complaint.
  - h. Ensure that all Sponsor/Borrower's contractors hired for construction and operation activities comply with the applicable environmental, labor, social and health and safety requirements of the loan agreement.
  - i. Implement ongoing information disclosure and consultation activities related to environmental, labor, social, and health and safety aspects of the Operation, including disclosure of Environmental and Social Compliance Reports and, as applicable, participatory monitoring.
  - j. Implement an environmental, health and safety, social and labor management system that is consistent with ISO 14001.
- 8.2 Prior to the date of Financial Close, the Sponsor/Borrower must present the following:
- a. The Environmental Quality Program, including Noise Emissions Control Plan
  - b. The final design solution for sanitary and industrial wastewater treatment and disposal
  - c. The Construction Work Environmental Control Program including the environmental control measures and environmental programs related to Impacts on Water Quality and Sediments Associated with Dredging Operation and Impacts on Land, Aquatic and Transition Ecosystems and those contemplated in the Aquatic Biota Monitoring Programs, Natural Resource Conservation Program, Environmental Quality Program and Risk Management Plans and Individual Emergency Plans
  - d. The final Dredging Management Plan, in form and substance acceptable to the IDB,
  - e. The Green Turtle Monitoring Program, and
  - f. The Social Communication Program.
- 8.3 Prior to First Disbursement of the Loan, the Sponsor/Borrower shall present to the satisfaction of the Bank the following:
- a. Environmental and Social Management plan for the construction phase,
  - b. Health and Safety Management Plan for the construction phase,
  - c. Plan to manage potential risks to community health and safety,
  - d. Grievance Mechanism and public disclosure of the procedure,
  - e. Contingency Plan and Spill Prevention and Counter Control Plan for the construction phase.
- 8.4 Prior to the initiation of operations and Technical Completion, the Company shall submit in form and substance acceptable to the IDB the following:
- a. Environmental and Social Management plan for the operation phase,
  - b. Health and Safety Management Plan for the operation phase,
  - c. Environmental, Health and Safety Management System including labor and community safety for the operation phase,
  - d. Contingency Plan and Spill Prevention and Counter Control Plan for the construction phase.

- 8.5 Prior to each disbursement, the Sponsor/Borrower shall certify compliance with all environmental social, health and safety and labor requirements in the loan agreement.
- 8.6 The Sponsor/Borrower shall as a specific requirement for Operation Technical Completion submit the following:
- a. Submit to IDB, in form and substance satisfactory to IDB, a final Construction Phase Environmental and Social Compliance Report.
  - b. Submit to IDB, in form and substance satisfactory to IDB, a finalized Environmental and Social Management Plan for the Operation's operational phase.
  - c. Submit to IDB, in form and substance satisfactory to IDB, the Contingency Plan for the Operation's operational phase.
  - d. Submit to IDB, in form and substance satisfactory to IDB, the Health and Safety Plan for the Operation's operational phase.
  - e. Submit to the satisfaction of the IDB, evidence of completion of specific environmental and social programs (e.g., bio-restoration programs, completion of compensation plans including livelihood restoration, etc.) required to ensure compliance with IDB safeguards.
- 8.7 During the life of the Loan Agreement, the Sponsor/Borrower must prepare and submit an Environmental and Social Compliance Report, in form, content and frequency acceptable to IDB.
- 8.8 To provide for Bank monitoring of the Operation's environmental, social, health and safety, and labor aspects the Loan Agreement shall provide for:
1. Direct Bank supervision actions (e.g., site visits, review of documentation, consultations with affected parties and third parties, etc.)
  2. The Bank's right to contract an external independent environmental consultant to perform more detailed supervision/monitoring actions during the Operation's construction and initial operation by the Sponsor/Borrower, and, as needed through the life of the loan.
  3. The Bank's right to contract for the performance of an independent environmental, social, health and safety, and labor audit, if the Bank deems necessary.
  5. The Borrower's agreement to provide access to all relevant documentation, facilities and personnel and cooperate fully with any inspection or audit by the Bank or its designated consultants.
  6. The Borrower's agreement to cooperate fully with the IDB's Independent Consultation and Investigation Mechanism (ICIM).
- 8.9 The Bank will monitor the Project's environmental, social, and health and safety aspects via internal Bank supervision actions (i.e. site visits, review of documentation, etc.) and will contract an external independent environmental consultant to assist the Bank in supervision/monitoring of the Project. In addition, the Bank will have the right as part of the Loan Agreement to contract for the performance of an independent environmental, health and safety audit, if needed.