

INTER-AMERICAN DEVELOPMENT BANK



BRAZIL

***SÃO PAULO METRO LINE 4
(BR-L1079)***

***ENVIRONMENTAL AND SOCIAL MANAGEMENT REPORT
(ESMR)***

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BR-L1079 São Paulo Metro Line 4
Environmental and Social Management Report (ESMR)

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I INTRODUCTION

- 1.1. The Bank has been approached regarding potential financing for the São Paulo Metro - Line 4 (“Line 4”), pursuant to the award of a 30-year Public-Private-Partnership (“PPP”) concession (the “Concession”). The Concession is to take place under the responsibility of the Government of the State of São Paulo (“GoSP” or the “Granting Authority” through the *Secretaria de Estado dos Transportes Metropolitanos* (“SETM”) and in coordination with *Companhia do Metropolitano de São Paulo* (“Metrô”). The Project represents one of the first PPP projects under new Federal and State PPP legal framework. Line 4 is the first in a list of PPP projects contemplated by the State of São Paulo in the short-to-medium term.
- 1.2. The PPP is structured such that the public sector performs the civil works before turning over the operation and maintenance to the private sector under a concession. The financing from the Bank would be to support the private sector concessionaire to procure, install, operate and maintain rolling stock and control systems for Line 4. The concessionaire will then operate and maintain the system for the 30-year life of the Concession (the “Project”). The construction of all infrastructure work necessary for the concession (i.e. track infrastructure, new metro stations and maintenance yard) is being carried out under the responsibility of the Brazilian public sector (GoSP), under supervision and according to the requirements of the World Bank.⁽¹⁾
- 1.3. The Project was awarded to a consortium led by a Brazilian transportation group pursuant to an international public bidding process with the GoSP. The winning consortium consists of CCR S.A. (68%), which will participate alongside Montgomery Participações S.A. of Portugal (30%), Benito Roggio Transportes S.A. of Argentina (1%), and RATP Développement S.A of France (1%) (collectively, the “Sponsors”). The consortium formed a Special Purpose Company named ViaQuatro (the “Concessionaire”, the “Project Company”, the “Company” or “ViaQuatro”) for the sole purpose of performing under the terms and conditions of the Concession.
- 1.4. The Project under consideration for financial support by the Bank involves the operation and maintenance of the line and rolling stock. The present Project does not involve civil works construction. Therefore, the potential relevant negative environmental and social and health and safety impacts and risks will be those typically associated with operation and maintenance of railway lines, such as: (i) increased noise levels in some areas, like in the vicinities of the Maintenance Yard, as most of the subway line is underground; (ii) increased vibration transmitted to the soil and structures in some areas; (iii) inadequate handling and disposal of wastes generated at offices, stations and mechanical shops; and (iv) risks of accidents involving users at stations and/or workers in maintenance activities along the line or at the Maintenance Yard. Other possible risks and impacts may arise in case of improper management of environmental and social; and health and safety aspects during operation and maintenance. However, the impacts and risks associated with the operation and maintenance of Line 4 are expected to be relatively low, as the line, stations, and maintenance yard are new and being constructed following requirements of the World Bank and using modern equipment.

(1) The work on Line 4 is, as recommended by the World Bank, monitored by the following Units reporting to the Bank: *PCU - Project Control Unit* (pertaining to institutional issues); *PMU – Project Management Unit* (pertaining to financial issues) and *PMOC – Project Management Oversees Commission* (pertaining to technical issues on environmental and social management of the project).

- 1.5. Nevertheless, indirectly related to the Project, there may be some potential environmental and social liabilities and/or reputational risks in association with possible improper mitigation of construction-related impacts by the public sector, which is under supervision by the World Bank. The ESDD included also assessment of these potential liabilities.
- 1.6. As a result of the schedule for the construction and expected beginning of operations of Line 4 in 2010, ViaQuatro is undergoing the initial stages of structuring the Company, defining the staff and technical procedures, including those related to environmental, social, and health and safety procedures for its operations. As such, IDB requirements establishes that during this period, which precedes operations, the Company should develop and effectively implement appropriate Environmental, Social and Health and Safety Management Systems to ensure that operation and maintenance of Line 4 will be carried out within the appropriate standards and in compliance with IDB's policies and requirements.
- 1.7. Taking into account the associated environmental impacts and control measures, as well as the requirements outlined in IDB's OP 703 Environment and Safeguards Compliance Policy, the Project has been classified as a Category B operation.

II PROJECT DESCRIPTION

A. Proposed Project Components

- 2.1. The *Companhia do Metropolitano de São Paulo* ("Metrô") has been operating, since September 14th, 1974, in the São Paulo Metropolitan Region ("RMSP")⁽²⁾. The Metrô system totals 61.3 km in four lines and 55 stations: Line 01 - Blue (stations between Jabaquara and Tucuruvi); Line 02 - Green (stations between Alto do Ipiranga and Vila Madalena); Line 03 - Red (stations between Corinthians-Itaquera and Palmeiras-Barra Funda); and, Line 05 - Lilac (stations between Capão Redondo and Largo Treze). The system is integrated with *Companhia Paulista de Trens Metropolitanos* ("CPTM") in the stations Brás, Palmeiras-Barra Funda, Tatuapé, Corinthians-Itaquera and Santo Amaro and with the other transportation modes in the city of São Paulo. Daily the subway transports approximately three million passengers⁽³⁾.
- 2.2. Line 4 (or Yellow Line) will cross metropolitan São Paulo in an Southwest-Northeast direction and with a total extension of approximately 12.8 km. Line 4 will connect large business centers such as the *Centro Histórico* and the *Centro Novo (Avenida Paulista)* to more residential areas such as *Pinheiros-Faria Lima* on the Southwestern end of the line, and will promote the integration of the other subway lines and urban train lines, operated by CPTM, as well as urban bus terminals in the region which are operated by the São Paulo Municipality (*Prefeitura Municipal de São Paulo* - "PMSP") (see figures in Annexes I and II).
- 2.3. The subway system of São Paulo currently serves a large portion of the city, but key areas such as those mentioned above still have no adequate public transportation access. For that reason, commuters use private vehicles or buses to the detriment of traffic flow, street conditions and air quality. The operation of Line 4 is expected to significantly enhance traffic conditions in this Southwest-Northeast corridor by providing faster access to these important

(2) São Paulo Metropolitan Region (RMSP) comprises 39 municipalities totaling a population of approximately 19 million.

(3) <http://www.metro.sp.gov.br>.

commercial and residential centers and reducing travel times for both users of the subway system and urban roads.

2.4. The Project will be implemented in three phases:

- (a) **Phase 1:** Operation of Line 4 with six stations (Butantã, Pinheiros, Faria Lima, Paulista, República and Luz) and the Vila Sônia Maintenance Yard. The operations are to be carried out with a fleet of 14 trains. Phase 1 shall have a minimum operating period of at least four years before the beginning of Phase 2;
- (b) **Phase 2:** Operation of Line 4 with all of its projected stations: Vila Sônia, Morumbi, Butantã, Pinheiros, Faria Lima, Fradique Coutinho, Oscar Freire, Paulista, Higienópolis, República and Luz. The route from the Vila Sônia station to Taboão da Serra will be operated by the Concessionaire by means of buses, without additional charge for the users;
- (c) **Phase 3:** Operation on tracks on the section between Vila Sônia and Taboão da Serra stations, whose operating conditions will be defined while the contract is being fulfilled.

- 2.5. For Phase 1, ViaQuatro will be responsible for the supply of rolling stock and operating systems including 14 metro trains with six cars each; train signaling and control system, based on a centralized supervision and control system located at the Vila Sônia Yard; and a mobile voice and data communications system.
- 2.6. Still for Phase 1, Metrô is responsible for the construction of all necessary tunneling and civil works related to the creation of Line 4 including track infrastructure, maintenance yard and six new metro stations along the Line, and the structure of three intermediary stations: Fradique Coutinho, Oscar Freire and Higienópolis.
- 2.7. All maintenance will be performed in the Vila Sônia Yard (or “Yard”). This Yard will have the capacity to park 25 trains, with platforms and equipment for cleaning the trains, and the necessary administration areas. The Vila Sônia Yard will allow the automatic receiving and dispatching of trains, without the help of operators. As such, the entire train parking area will be segregated from the remaining of the yard, in order to avoid accidents with circulating personnel.
- 2.8. For Phase 2 the following elements will need to be delivered or expanded by ViaQuatro: total of 29 trains including the original 14 trains supplied in Phase 1 (i.e., additional 15 metro trains with six cars each); expansion of the train signaling and control system, supplied in Phase 1; expansion of mobile voice and data communications system, supplied in Phase 1; expansion of the centralized supervision and control system located at the Vila Sônia Yard, supplied in Phase 1.
- 2.9. For operation of Phase 2, Metrô will be responsible for the conclusion of the Fradique Coutinho, Oscar Freire, and Higienópolis stations; completion of the Vila Sônia Maintenance Yard and Bus Terminal.

A.1 Concessionaire Equipment

- 2.10. *Rolling Stock.* The trains will be composed of six railcars, without an operator's cabin, but with command console for manual operation, if necessary, and with continuous interconnection and emergency doors at the extremes. The system has been designed to transport 60 thousand people per hour per direction using the six car trains at an average speed of 35 km/hr, with each train carrying approximately 1280 people.
- 2.11. *Signaling System.* The signaling system will cover the entire network, including the main lines, the stations and the maintenance and storage yard. It will be a Communications Based Train Control ("CBTC") system, including the continuous, bi-directional and high capacity track-train communication subsystem, for transmission of signaling, control and diagnostics parameters in real time throughout the track, stations, yard and parking areas.
- 2.12. The system will comprise an Operation Control Center (*Centro de Controle Operacional - "CCO"*) that will have communications with the trains through the wayside (signal elements are physically located to the side of the track) and on-board CBTC systems. The system will automatically control the trains and the platform screen doors, and ensure the safety of the trains through a system of virtual moving blocks. The system will allow for continual monitoring of the position of each train, and enable the on-board communications and video monitoring to be transmitted back to the Control Center through a fiber optic network.
- 2.13. The CBTC system to be installed in São Paulo will allow fully automatic operation of the trains, which not only will simplify the trains and their operation, but will also increase safety and their capacity as no operator's cabin will be required.
- 2.14. *Voice and Data Mobile Communication Subsystem.* This subsystem will include track to train communication to allow the transmission of Closed Circuit Television images from the trains (both internal and external) to the CCO; voice and data communication from the CCO to the passengers utilizing the train systems, through sound systems ("PAS") and through Information Panels ("PIS"); and voice communication between the CCO and the maintenance, operation and security staff of Line 4 in the stations, trains, tracks and yard.
- 2.15. *Vila Sônia Yard Control System.* This system will provide: monitoring of train movement in the Yard, monitoring of the power and auxiliary systems in the Yard, and failure detection and diagnostic in support of maintenance activities.
- 2.16. *Centralized Supervision and Control System.* System capable of supervising and controlling the following systems and functions: the systems and equipment of Signaling System, Voice and Data Mobile Communication Subsystem, and Vila Sônia Yard Control System; the operational and auxiliary systems; recording of data on and incidents that occur with the fleet of trains and all of the systems that comprise Line 4; recording all images from the Closed Circuit Television systems of the stations, tunnels and trains; and recording all communication from the CCO Control Posts, handled through the landline or mobile communications systems.

A.2 Concessionaire Operation

- 2.17. Line 4 operation will be performed by ViaQuatro, and will be done daily from 4:40 AM to midnight in integration with other subway lines and other urban mass transportation systems. Programming of the train services will be designed in order to provide regular and continuous services according to the variation in demand throughout the day.
- 2.18. ViaQuatro will provide complementary services for users such as: (i) allocation of employees to provide information and servicing; (ii) sound and visual signage information; (iii) lost and found service.
- 2.19. *Accessibility.* The Line 4 system will be in compliance with Presidential Decree No 5296/2004, Federal Laws No 10.048/2000 and No 10.098/2000 and ABNT (Brazilian Technical Standards Association) standard NBR 14.021, which guide the accessibility to urban or metropolitan trains. Furthermore, public areas will comply with standard NBR 9050 dealing with accessibility for people with special needs or people with impaired mobility in public spaces, buildings, furniture and urban equipment.
- 2.20. ViaQuatro will adopt a Computerized Maintenance Management System in which all activities will be registered in the database. All urgent occurrences and programmed maintenance activities will be inserted in the system, as well as the date of their execution and other information that enable traceability.
- 2.21. *Users' Satisfaction.* In compliance with the Concession Agreement, ViaQuatro shall be periodically assessed by the Granting Power based on three types of performance indicators: (i) operating performance indicators; (ii) users' satisfaction indicator (which will be performed by an independent institution and will assess the level of satisfaction of users of the new line by means of specific direct surveys); and (iii) maintenance quality indicators. If the values of these indicators fall below certain defined limits, the Concessionaire may be penalized, including by reduction of income associated with the services provided.

B. Project Workforce

- 2.22. The allocation of workforce that is anticipated as necessary for the operation during the concession period is indicated in the following chart.

Table 2.1. - ViaQuatro Workforce Estimates

Position	Phase 1				Phase 2									
	3	4	5	6	7	8	9	10	15	20	25	30	31	32
	2009	2010	2011	2012	2013	2014	2015	2016	2021	2026	2031	2036	2037	2038
Board	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Administration	86	86	86	86	86	86	86	86	86	86	86	86	86	86
Operation	263	263	265	265	409	409	414	414	417	417	417	417	417	417
Maintenance	195	195	195	195	298	298	298	298	298	298	298	298	298	298
TOTAL	571	571	573	573	820	820	825	825	828	828	828	828	828	828

C. Other Components

- 2.23. As per the Concession Agreement, ViaQuatro will be allowed to obtain alternative revenues by marketing spaces in the facilities and trains, as long as they do not affect the quality and standard of the services. The type of uses and activities are outlined in the mentioned agreement. Advertisement messages that do not comply with legal standards will not be allowed, nor will activities that may impair users' traffic and safety. Furthermore, in relation to advertising, the Concessionaire shall reserve specific spaces for campaigns of public interest previously agreed upon with the Granting Power.

III. ENVIRONMENTAL LICENSING COMPLIANCE

- 3.1 Brazilian and State of São Paulo environmental legislation usually foresees three sequential environmental licenses for large projects: (i) a Preliminary License at planning stage; (ii) an Installation License to initiate construction; and (iii) an Operating License authorizing operation of the project.
- 3.2 The Preliminary License for Line 4 was granted in March 1997 by the State Environmental Agency, based on the respective Environmental Impact Assessment Report and Statement ("EIA/RIMA") and/or a Preliminary Environmental Report ("RAP"). The Installation License was granted in December 2001. These licenses were requested by Metrô.
- 3.3 In the case of the Project being considered by IDB an Operating License shall be obtained and the process for that will be initiated on a timely basis, as the line is expected to initiate operation only in 2010.

IV ENVIRONMENTAL AND SOCIAL CONDITIONS

A. Physical Environment

- 4.1 The São Paulo region is located in the transition zone between the warm climates of the low latitudes and the mesothermal climate of the middle latitudes. In terms of rainfall, it is characterized by a rainy summer and a dry winter. During the winter season, there are thermal inversion episodes which increase the concentration of atmospheric contaminants, adversely affecting the air quality which is most notably a result of vehicle emissions.
- 4.2 In geological and geomorphological terms, Line 4 of the São Paulo subway, with its total extension of 12.8 km, in a section which corresponds to more than half of the total length, passes the São Paulo Tertiary Sediment Basin, with the occurrence of soft clays, silty clays, sandy clays, and also crossing areas of granite-gneissic rocks. It is characterized by hills and flat tables in altitudes between 700 and 800 m. above sea level, with slopes between 20 and 30%. Reddish yellow topsoil is predominant in the superficial layer of weathering or colluvial origin.
- 4.3 The section serviced by the Line 4 of the São Paulo subway is not characterized as a region subject to dynamic surface processes with intensity sufficient to cause damage to the drainage

system. Despite the occurrence of sections with thick and porous soil with steep slope, the region offers an efficient and consolidated urban infrastructure.

- 4.4 Throughout the extension of Line 4, there's only one location with the occurrence of flooding: in the vicinities of Vital Brasil station, however, without risk of affecting the Station since it is located in the highest point in the area. It was near this section (work on the Pinheiros River Station well construction site) that an accident of large proportions occurred on January 12, 2007, causing the death of seven people and affecting households and commercial establishments. The causes of the accident are still under investigation.⁽⁴⁾
- 4.5 The main water stream in the project's direct area of influence is the Pinheiros River. Crossing of the river will be done through a tunnel and no direct interference is expected as a result of the work. Line 4 will also cross, through tunnels, other smaller streams generically called creeks. These creeks, which have been channeled for some decades through closed galleries, in general have the water quality compromised by discharges of domestic sewage. Nevertheless, due to the depth where the subway tunnels will be located, no direct interference is expected in this natural drainage network, with the exception of the channel on Avenida Imigrante Japonês, Jardim Leila, near the Vila Sônia Yard. Therefore, specific risk assessments were carried out concerning possible risks to the Project and appropriate control measures have been introduced both in design and construction of the new line, to avoid any interference with that channel.
- 4.6 The direct area of influence of Line 4 normally presents, as indicated by the monitoring carried out by CETESB (state environmental agency responsible for pollution control), regular or inappropriate air quality during a large part the year, with more severe periods during the winter, when weather conditions are unfavorable for the dispersion of contaminants. Road traffic is the main source of air contaminants.
- 4.7 Similarly, acoustic comfort conditions in the direct area of influence of the project are severely degraded as a result of intense road traffic and densely populated urban areas. This problem tends to worsen year after year as a result in the growth of the city's vehicular fleet, which reached the 6 million mark on February 20, 2008.

B. Biotic Environment

- 4.8 Relative to the flora, as the areas to be crossed by the new line are fairly urbanized, no conservation units or other relevant ecological areas are present in the area of influence of the project. The implementation of the line will only pose some pressure over green areas in the Districts of Pacaembu, and Jardins Europa, América and Paulistano. In the remaining green areas, the influence of Line 4 will be insignificant, since areas with greater significance were preserved by judicious choice of route and construction methods.
- 4.9 In the Environmental Action Plan (*Plano de Ação Ambiental* - "PAA") developed by Construction Consortium, a written record of the existing vegetation that would be affected by the installation of the worksites was prepared and compared with the significant vegetation register in the city of São Paulo. The document also included a diagnostic of the probable areas to dispose of vegetation trimmings. The Register contains 23 locations that contain the

(4) Mitigation of the social impacts resulting from the accident - involuntary relocation of families, indemnities, etc., has been supervised by the World Bank, the project financing agency, and the actions adopted are in line with World Bank's Policies.

necessary worksite for the construction of the stations, ventilation wells, emergency exits and support areas (worksites and discharge areas). The vegetation found in these locations is limited to urban vegetation in streets and squares and some trees in properties (normally vacant lots).

- 4.10 Regarding the fauna, as a result of the intense urbanization process in the project's direct area of influence, no species of interest were reported, only animals fully adapted to urban life were found.

C. Human Environment

- 4.11 The São Paulo Metropolitan Region ("RMSP") encompasses 39 municipalities with the total population of 19 million inhabitants, 11 million of which live in the city of São Paulo itself. This Region represents one of the largest urban settlements in the world. Nevertheless, the city has been growing at progressively smaller rates, inferior to the growth rate of neighboring cities that comprise the so-called macro-metropolis (mainly São José dos Campos, Jundiaí, Campinas, Sorocaba). The economic base is diversified, with an increasing share of the service sector. According to the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* - "IBGE"), in 2005 the services sector represented 59% of the Metropolitan Region's GDP and 63% of the city's GDP. Relative to income of the population in the area of the project, the Pacaembu region stands out with an average per capita income equivalent to 14 minimum wages, whereas in Itapecerica da Serra the average per capita income is equivalent to less than one minimum-wage.
- 4.12 The mass transportation system which services the RMSP is comprised by the *Companhia do Metropolitano de São Paulo* ("Metrô"), by the *Companhia Paulista de Trens Metropolitanos* ("CPTM") and by *Empresa Metropolitana de Transportes Urbanos* ("EMTU") (all three are state government owned companies) and *São Paulo Transporte S.A.* ("SPTrans"), a municipal government company dedicated to planning and management of mass transportation and contracting of private companies to provide urban buses and their operation. Additionally, other cities comprising the RMSP are serviced by private urban bus companies, normally under the regime of a municipal concession.
- 4.13 The subway system is integrated with CPTM at the Brás, Barra Funda, Tatuapé, Corinthians-Itaquera and Santo Amaro stations. CPTM has six lines in operation in a total of 262.8 km, 97 stations and transporting 1.2 million passengers per day.
- 4.14 EMTU/SP was created on December 13th, 1977, with the creation of the Sistema Metropolitano de Transportes Urbanos (Metropolitan System Urban Transportation). Currently it is responsible for managing the following systems: São Mateus / Jabaquara Metropolitan Corridor (33-km trolley bus line and capacity for 210,000 passengers/day). Regular Metropolitan System (50 operating companies and 1.2 million passengers/day capacity), Airport System (interconnects the São Paulo International Airport, in Guarulhos, to the city through six special lines and two common), Metropolitan System (595 operating companies and 511,000 passengers/day capacity).
- 4.15 All bus lines in the city of São Paulo are operated by private companies under supervision of SPTrans, which issues service orders for the operation of each line, including the definition of routes, schedules and necessary fleet, in addition to operating 17 transfer terminals. Currently,

54 companies operate a fleet of approximately 10 thousand buses and 800 lines; offering services to nearly 4 million passengers per day.

- 4.16 In terms of other relevant projects, located in the area of the project, the following should be noted: (i) Urban Operation Project (*Projeto de Operação Urbana*) being developed by São Paulo Municipality (“PMSP”) related to the implementation of Line 4, covering the regions of Butantã and Vila Sônia, which should have as consequence the increase in population density, currently composed predominantly of single-family households; and (ii) The parking areas near the Morumbi soccer stadium, which will be necessary to meet demands of the *Football International Federation Association* (“FIFA”), in order for the city of São Paulo to be one of the host cities for the 2014 Soccer World-Cup. Despite the area for the parking lot is not yet defined, it may come to be an important support point for residents of this region and may contribute to increase the use of the subway.
- 4.17 Relative to generation of traffic, the major generating hubs identified in the area of the study, which cause some interference in their vicinities, are: Makro Supermarket, Butantã Shopping Mall and Cícero Pompeu de Toledo Stadium (Morumbi).
- 4.18 Concerning the Historic, Archeological and Cultural Heritage, Metrô obtained from governmental agencies associated with preservation of historic heritage at federal level (“IPHAN”), at state level (“CONDEPHAAT”), and at municipal level (“CONPRESP”), the approval of the project. Only the documents issued by CONPRESP specify certain guidelines for the detailed project design, such as for example, issues referring to protection of historic buildings, interference with vegetation and position of the ventilation tower intakes.

V ENVIRONMENTAL AND SOCIAL IMPACTS, RISKS AND MITIGATION MEASURES

A. Basic Aspects

- 5.1 The Project under consideration for financial support by the Bank involves the operation and maintenance of the line and rolling stock. The present Project does not involve civil works construction. Therefore, the potential relevant negative environmental and social and health and safety impacts and risks will be those typically associated with operation and maintenance of railway lines, such as: (i) increased noise levels in some areas, like in the vicinities of the Maintenance Yard, as most of the subway line is underground; (ii) increased vibration transmitted to the soil and structures in some areas; (iii) inadequate handling and disposal of wastes generated at offices, stations and mechanical shops; and (iv) risks of accidents involving users at stations and/or workers in maintenance activities along the line or at the Maintenance Yard. Other possible risks and impacts may arise in case of improper management of environmental and social; and health and safety aspects during operation and maintenance. However, the impacts and risks associated with the operation and maintenance of Line 4 are expected to be relatively low, as the line, stations, and maintenance yard are new and being constructed following requirements of the World Bank and using modern equipment.
- 5.2 Nevertheless, indirectly related to the Project, there may be some potential environmental and social liabilities and/or reputational risks in association with possible improper mitigation of construction-related impacts by the public sector, which is under supervision by the World

Bank. The ESDD included also assessment of potential liabilities from the construction phase that could possibly migrate into the operation phase.

- 5.3 It should be pointed out that the operation of this new subway line will bring significant social and environmental benefits to the RMSP, especially concerning the improvement of urban conditions, with the increase in the public transportation safety, reduction of air pollution and noise emission levels as a result of reduction of bus fleets and road traffic in general in the Western and Southwestern Regions. Integrated to these benefits are significant social benefits associated with the optimization and integration of the public transportation system in the city of São Paulo, mitigating traffic problems in the main road network and reducing commuting time for users; and integrating more distant areas such as Campo Limpo and Educandário and the cities of Taboão da Serra, Embu, Itapecerica da Serra and Cotia to the job-creating centers like the Historic Downtown and Expanded Center (Paulista and Faria Lima Avenues). It is estimated that the implementation and operation of Line 4, integrated to the other subway lines and RMSP trains will promote an increment of approximately 970 thousand users per day.
- 5.4 Another important benefit that will be brought by the expansion of the subway system will be the potential reduction of poverty in the RMSP, as a result in the improvement of the transportation access for low-income population. A major part of the low-income population lives in the suburbs of the state capital where the deficiency of the urban structure and public transportation system is significant. The limited access promotes social exclusion of this population from the job-creation centers, to the health and education structure, as well as to the recreation and culture centers. It is estimated that, in its first phase, 24% of the users of Line 4 will be commuters who live below the poverty line (per capita wages of two dollars a day)⁽⁵⁾.
- 5.5 It should be pointed out that ViaQuatro must be in compliance with the Quality, Environmental, Health and Safety Policies from *Companhia do Metropolitano de São Paulo* (“Metrô”). In 1999, Metrô began to adapt its operations to the international standards for quality management, specifically to the ISO 9000 standards. In 2000 the first certification was obtained, the one for Rolling Stock Maintenance Process for Lines 1, 2 and 3. In the subsequent years the Maintenance of Quality Management System scope was increased and established the Quality Management System for the Operation, Purchase and Hiring Management, Administrative Services and Civil Works Management for Line 2 and Assembling.
- 5.6 In 2006 the Metrô received, through the representatives of *Fundação Vanzolini* (qualified by IQNet - The International Certification Network), the certification for the Safety and Occupational Health Management System - OHSAS 18001, which recognizes the system for management of issues related to health and occupational safety in the São Paulo subway system operations, and became the first subway company to have this certification in the country.

(5) BARONE, Márcia; REBELO, Jorge. Potential Impact of Metro’s Line 4 on Poverty in the São Paulo Metropolitan Region (SPMR). Link: http://siteresources.worldbank.org/INTURBANTRANSPORT/Resources/poverty_14_sp.pdf

B. Potential Negative Impacts, Risks and Mitigation Measures

- 5.7 The Project under consideration for financial support by the Bank involves the operation and maintenance of the line and rolling stock. Nevertheless, indirectly related to the Project, there may be some potential environmental and social liabilities and/or reputational risks in association with possible improper mitigation of construction-related impacts by the public sector, which is under supervision by the World Bank. Therefore, this report will also discuss some of the relevant environmental and social impacts associated with the construction phase.

B.1 Construction Phase

- 5.8 Prior to the transfer of the infrastructure to ViaQuatro, a detailed and extensive inspection will be carried out, including as well the support areas used for construction (spoil disposal areas, construction sites, etc.). Liabilities and pending issues due to the construction phase will likely be taken over by Metrô and/or the Construction Consortium. The procedures for this transfer will be jointly agreed upon between the parties and monitored by IDB.

B.1.1 Environmental

- 5.9 *Generation of Wastewater.* The main wastewater flux that are generated during the construction period basically result from pumping operations for lowering the water table in some of the construction areas, and possibly from refluxes of injection and construction water. The Construction Consortium has a Wastewater Management Program that will be complemented with daily measurements of pH and suspended solids.
- 5.10 *Solid Waste Generation.* Main solid wastes that are generated during the construction phase are from common use areas (cafeteria, bathrooms and offices); from ambulatories; inert waste (from land cleaning procedures and removal of dump material) and industrial (equipment packages: paper, plastic and metal; lubricants, grease, and scrap from vehicles, machinery and equipment maintenance). It should be pointed out that the Construction Consortium has a Waste Management Plan (“PGR”), whose main goal is to establish the criteria for appropriate management of industrial and commercial wastes generated in the construction activities.
- 5.11 The disposal of excess material (inert waste), removed from work fronts is being made in places approved by the State Environmental Department. Additional measures will be taken, in addition to the technical issues, such as the implementation of landscaping so as to assure the rehabilitation and future use of such areas.
- 5.12 *Changes in noise and vibration levels.* During construction, the main actions that generate increased noise levels are: demolition of buildings, installation and operation of construction sites and dormitories, relocation of road system and public utilities network, construction of stations, wells and tunnels, and transportation and disposal of material. The construction Consortium has been monitoring, by means of a sampling program, the noise level from the construction sites, with emphasis to the night shift.
- 5.13 *Soil and water contamination.* In the Environmental Action Plan presented by the Construction Consortium at the beginning of the construction phase, two areas were identified contaminated by fuel from car service stations situated close to the construction site, which required specific monitoring. As such, no specific monitoring is foreseen for the operation

phase. However, any problem verified during the construction will be reported in the Request for Operating License and can motivate monitoring demands from environmental authorities, such as CETESB.

- 5.14 *Soil stability changes.* Relevant changes imparted by the implementation of the project in underground layers can put at risk public services and neighboring buildings. On January 12, 2007, a structure slide from the future Pinheiros station caused the opening of a crater (800 m² and 32 m deep) and consequently partial burying of the construction site, tunnel and part of the neighboring urban perimeter. This accident caused seven casualties and the interdiction of more than 70 houses, commercial buildings. On April 2, 2007, an Conduct Adjustment Agreement (“TAC”) was signed between Metrô and the Construction Consortium, with the participation of Governmental Technological Research Institute (*Instituto de Pesquisas Tecnológicas* – “IPT”) and the Criminal Investigation Institute (*Instituto de Criminalística*). Metrô implemented an additional Resettlement Plan that foresees, in addition to the resettlement measures, psychological and medical assistance, indemnity anticipation, lodging expenses, and food for families of victims.

B.1.2 Social

- 5.15 *Expropriation.* In order to implement Line 4, a total of 281 expropriations of property were foreseen, being 98 of residential use and 183 of non-residential. The expropriations of properties affected around 300 people. To mitigate this impact, an Involuntary Resettlement Plan was prepared according to the guidelines of the World Bank, defining specific mitigating actions. This Plan was approved by the World Bank, the financing agency for the construction, and its execution has been accomplished according to the goals established, registering non-compliance situations. Due to the relatively reduced number of expropriations and to the current phase of the project, no associated liabilities of this nature are expected to migrate to the operation phase.
- 5.16 *Changes in building conditions and value.* It corresponds to changes that can be caused in physical conditions and value of buildings close to the areas directly affected by the construction works, which can lead to depreciation of property and risk to its physical integrity and that of its occupants. Usually the occurrence of this impact, even those of small magnitude has, as consequences, the appearance of cracks and fissures and/or deficiencies in sanitary installations. Measures to mitigate these impacts are, among others: (i) maintenance of a communication plan and immediate remediation in case of detection or complaint of risk or damage to buildings, including the need of evacuation; (ii) building monitoring plan for facilities potentially susceptible to risk; and (iii) adoption of construction techniques that generate low vibration.
- 5.17 *Interference with neighboring areas.* In the worksites and in various fronts of work, construction companies and suppliers must observe a set of rules in order to make the services that are going to be developed in compliance with the basic aspects of safety and of low interference with neighboring communities, such as: (i) control of particulate matter and gas and noise emission; (ii) security teams trained in the work sites and capable of guiding workers, visitors and the vicinity itself regarding possible risks; (iii) internal committees for accident prevention; and (iv) certification and training programs for drivers and equipment operators.

B.2 Operation Phase

B.2.1 Environmental

- 5.18 *Changes in noise and vibration levels.* As the new line will be mostly underground, the potential impacts related to noise during the operation of Line 4 will be concentrated mainly in the vicinities of the Maintenance Yard at Vila Sônia where the line reaches the surface and due to continuous movement of trains. Other acoustic impacts may be related to the ventilation systems, which are located in the internal area of the stations. The traffic of the subway trains may also generate vibrations that can propagate to the surface.
- 5.19 However, measures were taken in the design of the new line to minimize and even avoid the generation of noise and vibrations. With the purpose of reducing noise and vibrations associated with train circulation, the line will present a foundation composed of systems to absorb noise and vibrations called mass-spring system, at special sections of the main route, such as in the vicinities of hospitals, auditoriums, hotels and some houses. For noise deriving from the ventilation system, noise absorbers will be installed at the entrance and exit ends of air ducts. Acoustic barriers will be implemented at Vila Sônia Yard, if deemed necessary based on ongoing monitoring program.
- 5.20 In addition to these measures, during the Preliminary and Installation License processes a monitoring program was proposed for the physical environment to observe the evolution of conditions of air, noise, vibration and subsidence during the entire construction of the line as well as during the operation phase.
- 5.21 Relative to noise levels inside the trains, the users of Line 4 will be subject to lower levels than presently observed in the São Paulo Subway system, as the new trains will have air conditioning and the windows will be shut, preventing most of the noise from outside to interfere with the levels inside.
- 5.22 *Generation of solid waste.* Solid wastes will be generated during the operation phase as a result of the need to clean the stations, lines and trains, in addition to sludge from station toilettes and Vila Sônia Maintenance Yard. A greater amount of contaminated waste is expected to be generated at Vila Sônia Maintenance Yard due to mechanical and electric maintenance of rolling stock. Areas for fuel storage, hazardous chemical substances, lubricants, oil and grease that are generated by maintenance and similar tasks will be stored over impervious areas surrounded by contention dikes, designed in compliance with the applicable Brazilian Association of Technical Standards (“ABNT”). In addition, a Waste Management Program will be implemented in compliance with the Environmental Management System. The Plan will establish the procedures to properly manage the wastes generated during operation of the new line.
- 5.23 *Liquid effluent generation.* During the operation of the new line, domestic sewage is expected to be generated at stations and Vila Sônia Maintenance Yard; and industrial effluents will result from washing of parts, equipment and trains, also at the Maintenance Yard. Domestic effluents from stations will be treated using septic tanks and then pumped to the public sewage collection system to be sent to wastewater treatment plants. The Vila Sônia Yard project includes a liquid effluent treatment system (for domestic and industrial effluents),

using flocculants and biodigestors. In order to minimize effluent generation, the project also contemplates a system for reusing the washwater at the Maintenance Yard.

- 5.24 The installation of perimetric channels for the collection of stormwater runoff and/or washwater that may be potentially contaminated by oil and grease has been contemplated at maintenance areas and at all main drainage elements from Vila Sônia Yard. Such action will be performed by the use of siphoned boxes for water and oil separation in strategic areas.
- 5.25 *Soil stability.* Changes in soil stability and structure of buildings during the operation phase will be limited and can occur in a restricted way by underground settlements as a late reflex of the construction phase activities. The Concessionaire foresees a subsidence monitoring program, including the list of properties that were affected by subsidence during the construction phase.
- 5.26 *Air quality at stations.* During operation of subway systems the air quality at stations may be affected by particles and gases generated by the contact of the train wheels with the tracks, brakes, etc. However, this type of impact is usually not significant, as the concentrations of air contaminants normally do not reach unacceptable levels and human exposure is very limited in time. Also, the circulation of the trains and the subway air ventilation systems will help to dissipate the contaminants. Another possibility is that the air from the surface outside, which eventually gets inside the subway system, may present poor quality in some regions and, thus, the quality of the air inside the stations may reflect the quality of the air outside.
- 5.27 *Increased demand for public services.* Operation of stations, Maintenance Yard and bus terminals will increase the demand for public services such as water, electric power, telephone, sewage, etc. that must be previously addressed with the entities responsible for these services. No significant pressure is expected on these services, as the regions that will be served by Line 4 are already consolidated urban areas with services that are prepared to attend the additional demand.

B.2.2 *Health and Safety*

- 5.28 *Accidents with workers.* Health and safety aspects related to operation activities of Line 4 contemplate: (i) worker accidents - workers are exposed to moving trains or machinery; (ii) noise and vibration - workers may be exposed to noise and vibration from locomotives, rolling stock, and machinery; (iii) fatigue - workers may be affected by the length and time of the shift (e.g. night shifts, shift start times); (iv) electrical hazards - workers may be exposed to electrical hazards from electrified railway; (iv) electric and magnetic fields - workers on electric railway systems may have a higher exposure to electric and magnetic fields. As mentioned, the Company will operate the line adopting the health and safety procedures and plans that are required by national authorities and Metrô.
- 5.29 Additional health and safety issues include the following: (i) ergonomics at work inherent to the activities of Metrô operations; (ii) handling of hazardous materials at Vila Sônia Yard; (iii) health and safety aspects resulting from the operation of urban buses for Phase II. All these issues will be addressed by the Company's health and safety management system.
- 5.30 *Risk of accidents with users.* The subway operation must guarantee the physical integrity of employees and users, through the availability and reliability of its system and fixed and mobile equipment, as well as by the performance of its staff in the operation of the subway

system. As such, the following were risks were assessed: risks related to boarding and exit conditions, availability of safety equipment for emergencies (hydrants, extinguishers, etc.) operation of escalators, illumination system at stations, cleaning of stations and trains, number/presence of employees on platforms to prevent accidents in the crowd, company responsibility in case of accidents with users, risk of accidents in stairways, platforms, doors and risk of accidents with the trains (derailment, fire), and risks related to ventilation of stations and trains. The Company will develop and implement all the necessary contingency and emergency plans, which must be approved by Metrô, other competent authorities, and IDB.

- 5.31 Control measures such as better lighting system, correct number of employees and of equipment dedicated for service and safety will reduce the risks of accidents and increase user safety. As for the risk of falls on subway tracks, Line 4 system includes the installation of thick-glass panels to isolate the platform from the line, with safety doors aligned and synchronized with the train doors (similar to the system adopted at Line 14 of the Paris Subway, and in inter-terminal shuttle systems at many airports around the world), which will prevent such type of accidents given that the security doors will only open when the subway car arrives at the platform.
- 5.32 *Risk of public safety for users.* The subway operation must also assure public safety, aiming at the prevention and repression of theft and events that could disturb the order in the subway system. Therefore, the Company will develop plans and procedures to evaluate and address risks related to the presence of group of sport supporters and/or gangs; number of security personnel to guard and act in case of theft, assault, emergencies, etc.; risk of robberies and presence of criminals; risk of sexual harassment on trains and platforms; and risk of robbery on overcrowded trains and platforms.

B.2.3 Labor and Working Conditions

- 5.33 *Working conditions and worker rights.* All ViaQuatro workers will be registered and legally employed, have their rights respected as established by the Brazilian Consolidated Labor Laws, and will be entitled to health and other social benefits provided by the Company. The Concessionaire will be responsible for transportation, accommodation, food catering, medical care and welfare facilities for the personnel. The Concessionaire will pay rates of wages and observe conditions of labor, which are not lower than those established in the locality in which the project is located.
- 5.34 *Risk of unfair or discriminatory treatment.* In order to ensure a recruitment process of professionals without any discrimination, ViaQuatro will adopt a transparent recruitment process, coordinated by a human resources department.

C. Potential Positive Impacts and Benefits

- 5.35 *Increase in public transportation safety.* The reduction of traffic expected with the additional offer of transportation provided by Line 4 could contribute to the reduction in the number of accidents, especially accidents involving buses, which transport more passengers and are usually associated with a higher number of casualties when accidents occur.
- 5.36 *Changes in road traffic patterns and accessibility.* During the operation phase, regarding the local and regional road systems, the changes in road traffic patterns brought by the new

subway line will have a positive aspect, mainly in terms of reducing the number of buses and an integrated reorganization foreseen for mass transportation (bus lines). The negative impact from this change will occur in the vicinities of subway stations due to the higher flow of traffic and pedestrians. One of the most relevant positive impacts related to Line 4 will be an increase in the accessibility to the general population to other ways of transportation, due to the integration with the train system and other subway lines.

- 5.37 Line 4 will be a high-capacity transportation service, dedicated to linking the Southwestern Vector (*Vetor Sudoeste*) with the Metropolitan Center. In its first phase this line will provide services for approximately 700 thousand passengers per day and for the second phase, an additional 270 thousand users are expected, totaling 970 thousand passengers per day served. The Southwestern Vector is one of the most crowded regions of the city and RMSP, due to the growth of poor suburban areas, industrial activities moving to the interior and the increasing expansion of services at more traditional districts such as Paulista and Brigadeiro Faria Lima Avenues, marginal roads of the Pinheiros River to Santo Amaro Region. These changes created deep alterations on land use, and increasing vehicular traffic and causing traffic jams regardless of the day or period of the day.
- 5.38 Line 4 will be an important link to public bus transportation by creating a connection between the South Line of the metropolitan train system with the subway system, and by facilitating access for users to the “expanded center” of São Paulo, promoting a reorganization of the bus system that will work as a complementary system.
- 5.39 *Improvement in air quality.* Transportation is indicated as one of the biggest challenges in the fight against climate change, and a major contributor to the atmospheric pollution in urban centers and associated health problems. As for the climate change problem, chapter five from the Intergovernmental Panel in Climate Change (IPCC) reports that the transportation sector accounts for 23% of the emissions of atmospheric contaminants such as CO₂ and this is growing at a rate of 2% a year. In general, subway transportation systems do not emit contaminants such as other means of transportation that use combustion engines, present higher energy use efficiency, and in Brazil they use mainly a clean source of electric energy (hydropower). Therefore, expansion of subway lines and incentives to change in means of transportation end up promoting improvements in air quality. The operation of the new subway line will contribute to reduce the emission of CO₂ as well as other air contaminants such as CO, HC, NO_x, SO_x and particulate matter.
- 5.40 *Reduction in noise and vibration levels.* Similarly, a reduction in the levels of noise and vibration is expected to occur along the areas served by Line 4 due to the substitution of road traffic (buses and private vehicles) by subway trains that run underground (the exception will be in the vicinity of Vila Sônia Yard).
- 5.41 *Reduction in the number of traffic accidents.* The new subway line will also contribute to lower the number of traffic accidents by reducing the number of cars and buses on public roadways.
- 5.42 *Changes in land occupation and enhancement of economic activities.* Projects such as the subway can motivate changes in the profile of use and land occupation since they may change accessibility and property value around the areas they serve. So it is expected that this new line will provide an increase in the verticalization, especially at Butantã and Vila Sônia areas,

where single-family houses still prevail. A higher desirability for offices, clinics, schools and others is expected for this area. It is one of the most significant positive impacts.

- 5.43 *Changes in urban landscape.* The main change in urban landscape will be at Vila Sônia Maintenance Yard, which previously was an enormous vacant lot showing a degraded aspect. This is a positive change, including in terms of public safety for the local community even though there will be an increase in noise, especially for the houses in the vicinities of the Yard.

D. Other Potential Positive Indirect Environmental and Social Impacts

- 5.44 The analysis made regarding environmental and social impacts related to Line 4 of the São Paulo Subway, allowed the identification of three other impacts indirectly related to the project, which are extremely relevant: (i) the contribution of this project to reduce urban poverty; (ii) improvement in the urban conditions in the regions where the project is located; and (iii) reduction in greenhouse gas emissions and possibility of obtaining “carbon credits” associated with the introduction of cleaner technologies for the operation of the new line with the substitution of traditional technologies, and also the reduction of greenhouse gases related to the reduction on road traffic of vehicles fueled by petroleum products, and with a type of mass transportation system that uses electricity from renewable source (hydroelectric power plants)⁽⁶⁾.
- 5.45 *Reduction in urban poverty.* As for the contribution of Line 4 to the reduction in urban poverty it must be underlined that this line has a metropolitan reach greater than any other subway line from the São Paulo Subway system, due to its strategic role, integrating into other subway lines, suburb railroad networks and also into inter-municipal bus lines (**see figure in Annex II**). The number of people considered as low-income living in this area, which involves all metropolitan quadrants totals more than three million people, which means 79% of the population considered low-income in the São Paulo Metropolitan Area – RMSP⁽⁷⁾.
- 5.46 The low-income population living in the RMSP has low mobility and restricted use of public transportation. Investments, such as Line 4, will provide operational improvements in public transportation and fare integration with the existing transportation network will improve the accessibility of poor people to metropolitan job centers and reduce the transportation costs with benefits to the family income. Estimates from Metrô indicate that when Line 4 starts to operate, 22% of passengers transported will be from low-income population, against 13% on other subway lines and 19% in the general transportation system.
- 5.47 Most job openings in the service sector of the RMSP are located in Line 4 area of influence, totaling 1.3 million jobs. These are jobs available in offices, commerce, stores, personal and domestic services. Line 4 will provide the low-income population with access to these areas where job opportunities are concentrated. In Line 4 region the most important health, educational and leisure centers on RMSP are also located.

(6) IDB is preparing a Technical Cooperation with SECCI resources - Sustainable Energy and Climate Change Initiative – to develop a methodology for CDM - Clean Development Mechanism (*Mecanismo de Desenvolvimento Limpo*) which allows certification of the reduction of greenhouse gas emissions with the change in traffic systems implemented in the São Paulo Metropolitan Region. The change in transportation is related to operational and tariff improvement in the railway system and is also related to the future operation of Line 4 and the extension of Line 5.

(7) Paper published by the World Bank - Potential Impact of Metro’s Line 4 on Poverty in the São Paulo Metropolitan Region (SPMR) Márcia Barone and Jorge Rebelo.
http://siteresources.worldbank.org/INTURBANTRANSPORT/Resources/poverty_14_sp.pdf

- 5.48 *Improvement in urban conditions.* Relating to the improvement of the vicinities of the subway, the Municipal Strategic Master Plan (*Plano Diretor Estratégico Municipal*)⁽⁸⁾ foresees the implementation of the Butantã-Vila Sônia Urban Project (*Operação Urbana Butantã-Vila Sônia*), which encompasses an area of about 630 hectares, between Francisco Morato and Eliseu de Almeida Avenues. Urban Projects are a group of interventions and measures coordinated by the Municipality, with the participation of homeowners, residents, users and private investors, aiming at achieving in one urban area, structural urban changes and social and environmental improvements.
- 5.49 Among the investment plans foreseen in the Urban Project Butantã-Vila Sônia⁽⁹⁾ are those for improvement of traffic conditions in the region, redesigning Ministro Laudo Ferreira Camargo Avenue, linking Raposo Tavares road to Vila Sônia Station, through a tunnel under Parque Previdência, linking João Jorge Saad Avenue, improving traffic in this region. The construction of the South Bus Terminal (*Estação Rodoviária Sul*), next to Vila Sônia Station is foreseen, avoiding that buses coming from Vale do Ribeira and Southern Brazil have to cross the city to leave passengers at Barra Funda Terminal, as it is done nowadays.
- 5.50 *Reduction in greenhouse gas emissions.* The accrual of carbon credits due to the reduction of greenhouse gas emissions by changing petroleum-fueled vehicles to another transportation based on electricity generated almost entirely by hydroelectric power plants may provide the Metrô and the Concessionaire another source of revenue, with positive reflexes to implement the enlargement of this transportation service.
- 5.51 Preliminary studies conducted by Metrô and related to Line 4 indicated two possible scenarios for certification of credits due to reduction of carbon emissions associated with the operation of the new line. The first scenario considers the reductions associated with the new technological improvements in Line 4 and results in an estimated carbon dioxide emission reduction around 24 thousand tons per year. The second scenario considers the reductions associated with the reduction in road traffic along the region served by Line 4; In this case the results pointed out to an estimated carbon dioxide emission reduction of approximately 128 thousand tons per year.
- 5.52 As such, IDB is carrying on together with Metrô a Technical Cooperation, supported by IDB's Sustainable Energy and Climate Change Initiative (SECCI), for the development of a Clean Development Mechanism (CDM) methodology to generate Certified Emission Reductions from the implementation of new subway line sections in São Paulo.

(8) Plan approved by Municipal Law 13.430/2002,

(9) For this Urban Operation an Environmental Impact Study is being prepared to be presented to the Municipal Environmental Authority ("SVMA").

VI ENVIRONMENTAL, SOCIAL, HEALTH AND SAFETY MANAGEMENT

A. Environmental and Social Monitoring Programs

A.1 Construction Phase

- 6.1 *Monitoring of liquid effluents and waste.* The Construction Consortium sends monthly Environmental Follow-up Reports to the Metrô. Such reports show the volume and nature of solid waste and liquid effluents that were generated by the work fronts and by the main worksites.
- 6.2 *Monitoring of noise.* The Construction Consortium has a plan for measuring the sound levels in work fronts; such plan emphasizes measurements in the night shift, in compliance with the CONAMA Resolution 1/90, ABNT standard NBR 10.151/2000 and CETESB standards LI 11.031/86; LO 032/92 and 11.034/92.
- 6.3 *Monitoring of vibrations.* The Construction Consortium must present seismographic reports that are issued monthly, showing the admissible parameters, as well as the identification of non-compliances for cases that exceed admissible vibration levels, and the respective mitigating measures.
- 6.4 *Monitoring of subsidence.* The Construction Consortium monitors the properties that were affected by subsidence caused by the construction activities and identifies non-compliances. The identification of non-compliances may initiate a process of interruption of all activities at work fronts, which will resume only after technical solutions has been implemented to ensure safety.

A.2 Operation Phase

- 6.5 *Monitoring noise and vibrations.* During operation of Line 4, a monitoring program of the physical environment will be performed so as to assess the evolution of noise and vibration levels. Noise level measurement campaigns will be contemplated with the participation of CETESB. Such measurements will be compared to baseline conditions to be established immediately before the operation. As for vibrations, the sections that are more susceptible to generate vibrations will be monitored according to local geology and/or the line depth. To establish the baseline conditions, the buildings and other structures will have to be inspected and possible cracks and fissures found will have to be identified and documented. Such documentation will serve as baseline for the evaluation of the damage attributed to the operation of the new line.
- 6.6 *Monitoring soil and surface and groundwater contamination.* At Vila Sônia Yard at least two piezometers will be installed with filter section for periodical monitoring of groundwater quality. Training programs will simultaneously be applied to the employees that develop these tasks aiming at the environmental control of maintenance activities.

B. Health and Safety Procedures and Measures

- 6.7 *Monitoring health and safety aspects.* ViaQuatro will conduct health and safety inspections of Line 4 facilities and operations as well as of contractors. ViaQuatro will keep records of all work accidents and occupational illness.

C. Contingency Plan

- 6.8 ViaQuatro will present an Emergency Action Plan (“PAE”) and a Risk Management Plan (“PGR”) to address emergency situations that may represent a risk in terms of environmental contamination. Additionally, it will present an Emergency Fire Plan, which must be duly approved by the Fire Department. As part of these plans, ViaQuatro will prepare fire brigades duly trained at each relevant location. For events of accidents with the rolling stock involving passengers, ViaQuatro will rely on a Emergency Response Plan set forth according to the guidelines provided by Metrô and in line with Company’s management plans.
- 6.9 The Contingency Plan will include: (i) identification and specification of possible accidents; (ii) classification of risk scenarios, identifying for the most critical situations the scope of the area of the event and the receptors to the expected impacts ;(iii) detailing of the emergency action procedures with the definition of responsible personnel; (iv) list of third parties involved, including all possible agents involved with emergencies (Fire Department, civil defense, police, ambulance services, etc.); (v) specification of the need for training; (vi) system to register and document emergency occurrences; and (vii) procedures for the investigation of accidents.

D. Environmental, Health and Safety Management System

- 6.10 ViaQuatro intends to develop an Integrated Environmental, Social, Health and Safety Management System (“SGASS”). This system will be based on the principles of the ISO 14001 and OHSAS 18001 standards, even if certification of the system is not intended in a first moment. The SGASS will incorporate all environmental and social conditions and requirements set forth by IDB, as well as by the Environmental Authorities during the Operating License process, as well as others which may come to be identified through specialized consulting during the development of the system.
- 6.11 The SGASS will also include the definition of functions and responsibilities of those involved in environmental, social, health and safety issues in the ViaQuatro organization, including incorporating the responsibilities in their corresponding job descriptions.
- 6.12 Upon transferring the Line 4 infrastructure to ViaQuatro, a detailed and comprehensive inspection will be carried out along the entire new line, as well as all support areas used during construction (spoil disposal areas, worksites, etc.). Any liabilities and/or pending issues related to the construction phase will likely be assumed by Metrô and/or the Construction Consortium. Specifically concerning the Residents and Businesses Relocation Program, it is noted that Metrô was directly accountable for the execution of the Program and such resettlement has already been completed.

D.1 Environmental and Social Management System

- 6.13 The basic guidelines of ViaQuatro's Environmental and Social Management System will be driven by the following principles: (i) ensure compliance with IDB's environmental and social requirements and in-country regulations; (ii) improve the well-being and satisfaction of all employees and served communities, through the development and continuous improvement of best practices in environmental management; (iii) control environmental risks, reducing them to lowest level possible through the use of effective and efficient programs, technologies and procedures; (iv) contribute, through the incentives and technical support and/or formal requests for selection/hiring, to the gradual improvement in the environmental performance of contractors and suppliers, and to the development of their activities on a sustainable basis and in compliance with the applicable legislation; (v) raise awareness about the direct and indirect environmental risks/impacts associated with Line 4 activities; and (vi) communicate with total transparency to employees and communities in general about the environmental and social impacts and risks associated with Line 4 operation.
- 6.14 The Environmental and Social Management System will include the following programs: (i) Noise Monitoring Program; (ii) Water Quality Monitoring Program; (iii) Solid Waste and Liquid Effluent Management Program; (iv) Emissions and Atmospheric Contamination Monitoring and Control Program; (v) Damage to Third-Party Property Monitoring Program.
- 6.15 In addition, in compliance with the Concession Agreement, ViaQuatro will be periodically assessed by the Granting Power based on three types of performance indicators: (i) operating performance indicators; (ii) users' satisfaction indicator (which will be performed by an independent institution and will assess the level of satisfaction of users of the new line by means of specific direct surveys); and (iii) maintenance quality indicators. If the values of these indicators fall below certain defined limits, the Concessionaire may be penalized, including by reduction of income associated with the services provided.

D.2 Health and Safety Management System

- 6.16 ViaQuatro will detail health and safety procedures, standards, guidelines and programs. The Concessionaire will develop procedures to address its health and safety issues at corporate level in line with IDB's requirements, in-country regulations and OHSAS 18001 (international health and safety management standard).
- 6.17 As established in the Concession Agreement, the Concessionaire will present a Safety Plan covering: (i) a safety policy; (ii) annual targets and action plans to mitigate risks; (iii) empowerment and responsibilities; (iv) employee training; compliance with the applicable legislation, regulations and standards; (v) risk management process; accident and incident investigation and assessment system; (vi) system to collect and analyze safety performance information; and (vii) system for the development, approval and monitoring of corrective actions.
- 6.18 As required by applicable Brazilian health and safety regulations, Environmental Risk Prevention Plans ("PPRA") and Occupational Health and Medical Control Programs ("PCMSO") shall be presented. The PPRA shall contain: (i) identification and characterization of environmental risks; (ii) definition and implementation of control

measures; (iii) training; (iv) continuous monitoring of risk exposure; (v) procedures for investigation of accidents; (vi) continuous improvement and assessment procedures; (vii) Corrective Action Plans (“PAC”) if needed; and (viii) registration and communication of data and information.

- 6.19 All production units will have a person responsible for work safety, member of an Internal Accident Prevention Commission (*Comissão Interna de Prevenção de Acidentes* - “CIPA”) who will coordinate the execution of the corrective actions. The person responsible for occupational safety will periodically present a summary of the issues addressed in all CIPA meetings; statistics of accidents; assessment of accidents; aspects of the PPRA that are being assessed; training activities applied during the period; PAC implementation status.

D.3 Environmental and Social Responsibility

- 6.20 ViaQuatro will also operate with responsible and committed attitude towards environmental and social sustainability, as currently observed with other concessionaries under CCR administration (one of the main shareholders of the Line 4 Concessionaire). This performance involves projects and programs in the area of social, cultural, sports and environmental responsibility. The purpose is to contribute to the development of the communities and regions in which ViaQuatro operates and of the populations that interact with the Company.
- 6.21 Currently, the Social Responsibility Program of CCR Group is based on the following programs and projects: (i) to foster the donation of blood; (ii) birth support program to reduce infant mortality rates; (iii) itinerant cinema project in municipalities near the concessionaries; (iv) free dental care program; (v) program to help fight sexual exploitation of minors, created by the World Childhood Foundation (WCF) and Ethos institute.

VII PUBLIC CONSULTATION

- 7.1 The licensing process of the Line 4 involved ample communication and availability of information to the communities directly or indirectly affected by the project, highlighting the following aspects and events:
- (a) Communication to local population through wide circulation newspapers concerning the beginning of the licensing process and delivery of the environmental studies, as well as the granting of the Preliminary License and the Installation License for the new line;
 - (b) Availability for public consultation of the environmental impact studies at the State Environmental Department and Metrô;
 - (c) Technical seminars by the Metrô team clarifying doubts and addressing concerns of stakeholders about the projects and its impacts;
 - (d) General Meeting of the São Paulo State Environmental Council (“CONSEMA”), to discuss with members of environmental non-governmental organizations and other representatives of civil society the contents and recommendations of the EIA for the Line 4 project.

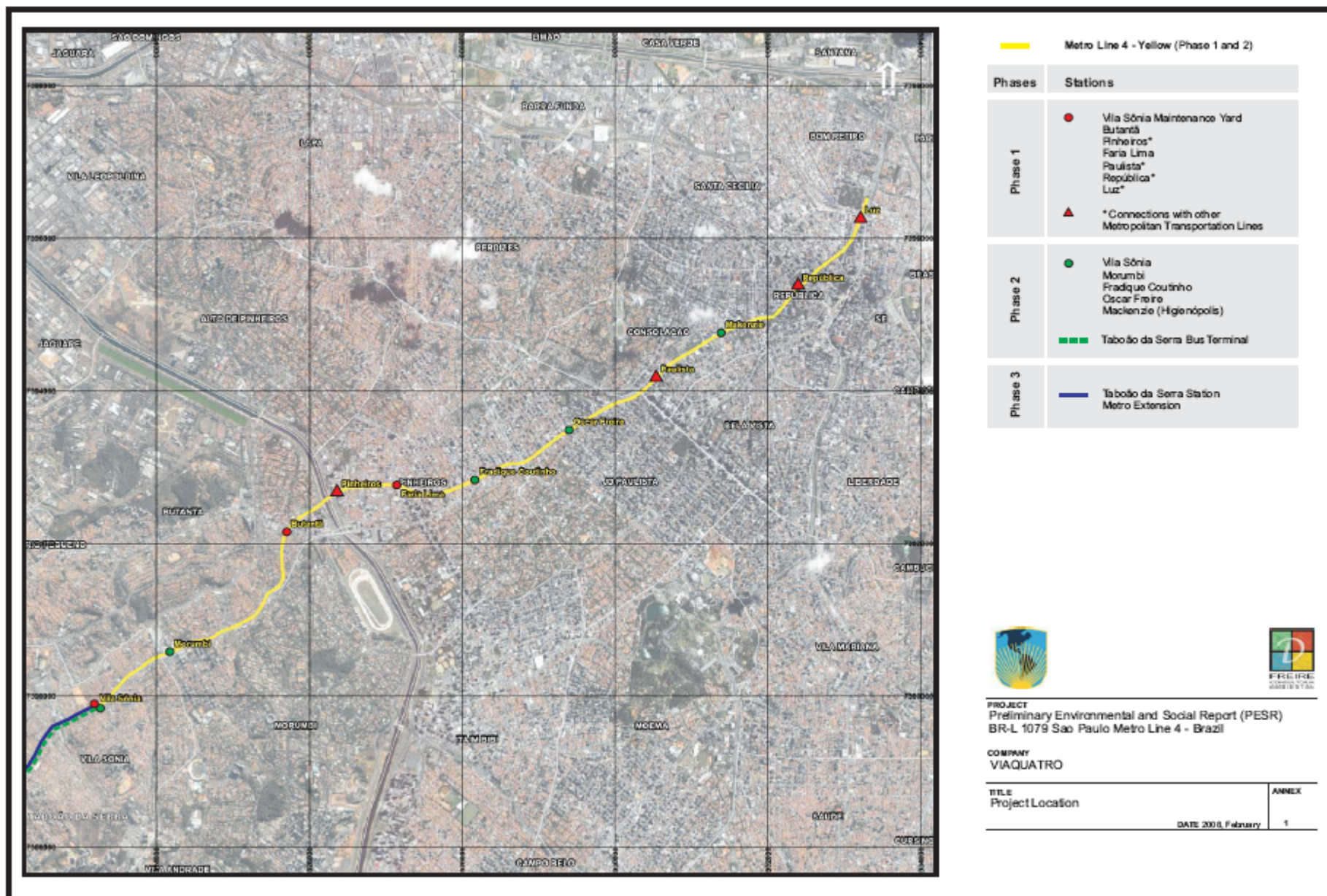
- 7.2 Also, as the construction of the project is being financed by the World Bank, it has to comply with that Bank's disclosure of information policy and guidelines, and Metrô has their own procedures and practice regarding public information, and maintains the following permanent communication and information channels available for the public in general:
- (a) Public availability of the Population and Business Resettlement Action Plan ("PAR");
 - (b) Installation of service centers for the population throughout Line 4 (registered servicing of approximately 30 thousand people up to now);
 - (c) Specific website in the Internet for Line 4 (www.linha4amarela.com.br) providing information and technical reports such as the Work Plan for addressing environmental programs and resettlement programs; and
 - (d) Hotline center for users and a channel at customer services of the subway to receive complaints, and answer to requests for information about Line 4.
- 7.3 Relative to the operation of Line 4, ViaQuatro has not been requested by the authorities to perform public consultations relating to their project and activities. Nevertheless, IDB has requested the Concessionaire to perform an Environmental Analysis ("EA") relating to the operation and maintenance of the new line, as well as addressing some relevant issues associated with the construction phase. The ensuing Environmental Analysis Report ("RAA") has been publicly disclosed according to Bank's OP-102 Disclosure of Information Policy, locally, at IDB's Public Information Center in Washington, DC, and Country Representative Office, and at the Bank's web site.

VIII RECOMMENDATIONS

- 7.1 IDB will require as part of the Loan Agreement that the Company and all portions of the Project shall, at all times during the life of the Loan Agreement, comply with each of the following:
- 1. All applicable environmental, health and safety Brazilian regulatory requirements and all applicable IDB's environmental and social policy and requirements.
 - 2. All requirements associated with any environmental, health and safety related permits, authorizations, or licenses that apply to the Project or the Company.
 - 3. All environmental, health and safety requirements of the Project contracts, and any subsequent modifications.
 - 4. All aspects and components of all of the Project environmental, health and safety documents.
 - 5. Applicable aspects of the World Bank General Environmental Guidelines (Pollution Prevention and Abatement Handbook, 1998).
 - 6. Applicable aspects of the World Bank Monitoring Guidelines (Pollution Prevention and Abatement Handbook, 1998).
 - 7. Applicable aspects of the International Finance Corporation Health and Safety General Guidelines (2007).
 - 8. Consult with IDB before approving or implementing any and all substantive changes to the Project or its timetable that could potentially have negative environmental, social, or health and safety effects.

9. Send written notice to IDB of any and all non-compliances with any environmental, social or health and safety requirement of the Loan Agreement and any significant environmental, social, or health and safety accident, impact, event, claim or material complaint.
 10. Ensure that all companies contracted for construction and operation activities comply with the applicable environmental, social and health and safety requirements of the Loan Agreement.
 11. Implement ongoing information disclosure and consultation activities related to environmental, social, and health and safety aspects of the Project, including, if applicable, information from environmental and social, health and safety monitoring reports prepared by external consultants, in compliance to Bank's OP-102 Disclosure of Information Policy.
 12. Implement and/or maintain Environmental and Social, and Health and Safety Management Systems that are consistent with the principles of ISO 14001 and OHSAS 18001.
- 7.2 Prior to Financial Closure the Company shall submit an environmental, health and safety action plan ("EHSAP"), in form and substance satisfactory to IDB, properly addressing the environmental, social, health and safety improvement recommendations, as well as any relevant pending non-compliance and/or liability associated with the Project or the Company. This Action Plan shall clearly address the following aspects:
1. The proposed actions, programs and plans to be adopted to improve environmental, social, health and safety management procedures, and correct any pending non-compliance and/or liability, including: (i) continue to comply with all applicable Brazilian environmental, health and safety regulations, and all applicable IDB's environmental and social requirements; (ii) develop and implement formalized and structured Environmental and Social and Health and Safety Management Systems to encompass the project and the activities of the entire Company; (iii) promote the up-streaming of responsibilities and accountability regarding environmental and social issues to upper management level; and (iv) provision of adequate environmental staff to better address environmental and social issues.
 2. A time schedule for implementing such proposed actions, programs and plans, including due dates and key milestones.
- 7.3 Prior to each disbursement, the Company shall certify compliance with all environmental social, and health and safety requirements in the Loan Agreement.
- 7.4 During the life of the Loan Agreement, the Company shall present, in form and substance satisfactory to IDB, the applicable documents, reports and plans indicated in the EHSAP, and prepare and submit Environmental and Social Compliance Reports ("ESCR"), in form, substance and frequency satisfactory to IDB.
- 7.5 The Bank will monitor the environmental, social, health and safety aspects in the Loan Agreement via internal Bank supervision actions (e.g., site visits, review of documentation) and will contract an external independent Environmental and Social Consultant to perform more detailed supervision/monitoring actions during the life of the Loan Agreement. In addition, the Bank will have the right, as part of the Loan Agreement, to contract for the performance of independent environmental, health, and safety audits, if needed.

Annex I: Project Location



Annex II: Integration of Subway Line 4 (Yellow) into the Metropolitan Network

