EXECUTIVE SUMMARY
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE 2.6-KM QUITUMBE ALTERNATIVE OF THE FIRST LINE OF METRO OF QUITO

Prepared By:

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1. INTRODUCTION

The Quito Metro Line One Project (*Primera Línea del Metro de Quito,* PLMQ), initiated in 2011, is considered a local and national priority that will lead to the improvement of mobility, productivity and quality of life for the residents of Quito, its surroundings, and the country in general. Quito Metro Line One is a long-term, large-capacity solution for public and mass transport of passengers traveling along the city's north–south axis, with 15 stations and a length of 22 km. Based on its operational capacity, Quito Metro Line One can become the central axis for transporting the required passenger volumes in the city of Quito. The project is currently under construction and its Environmental License was issued by the Ministry of Environment.

The present Environmental and Social Impact Assessment study was needed due to a proposed modification of the original layout of Quito Metro Line One, specifically the first section from the Quitumbe intermodal station. The following are some of the key aspects of the proposed alternative route:

- ✓ The original layout's design connects Quitumbe Station with the *Patio de Cocheras*, crossing through the existing bus parking area, which would create major interference because the proposed construction is by cut and fill.
- ✓ The original route includes Extraction Well 1 of the tunnel boring machine that comes from Solanda Station, in the roundabout of Rumichaca Avenue and Amaru Ñan, through which three pipelines pass: Poliducto (multi-purpose pipeline), Oleoducto (oil pipeline)- SOTE and Ambiental (water pipeline). The original design creates an interference between the extraction well and the abovementioned pipes.
- ✓ The original proposed works would require a considerable deviation of traffic in terms of area and time.
- ✓ The original route crosses the residential complexes of Pumapungo Street, which would cause inconvenience to residents due to cut-and-fill construction on a narrow street that serves as access to homes, also affecting the only access to the housing complex's parking lot.
- ✓ The original route crosses the Quebrada Ortega–Rumichaca–Pumapungo, for which a large-scale tricellular frame is projected, with the inconvenience that a drainage work of this magnitude entails.

Based on the above, the proposed 2.6-km Quitumbe Alternative in Quito Metro Line One will reduce the potential environmental and social impacts and risks. This alternative starts at Quitumbe Station (Condor Ñam Avenue), moving southward to Morán Valverde Avenue.

2. OBJECTIVES

The objective of the ESIA is to assess the potential environmental and social impacts of the proposed route for the 2.6-km Quitumbe Alternative in Quito Metro Line One based on current environmental legislation and other laws and requirements applicable to the project, including those of the international institutions financing the project. Key aspects of the ESIA include:

- Identifying the legal framework applicable to the ESIA;
- Describing the activities that will be part of the proposed project;
- Performing an analysis of alternatives for proposed new works;
- Determining areas of direct and indirect influence, as well as sensitive areas that could be affected by the possible environmental impacts of the project, work or activity;

- Determining the socio-environmental conditions and baseline of the study area of the project, work or activity;
- Identifying the possible socio-environmental impacts and risks that could be produced by the project's development; and
- Identifying the Environmental and Social Management Plan for the project, in order to avoid, minimize or compensate for the possible environmental and social impacts identified in the project.

PROJECT PROPONENT DATA

DESCRIPTION OF PROJECT PROPONENT	
Business Name of the Operating Company:	EMPRESA PÚBLICA METROPOLITANA METRO DE QUITO
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Telephone:	+593 2 3827 860

ENVIRONMENTAL CONSULTANT'S DATA

DESCRIPTION OF THE CONSULTANT	
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Consulting Registry in Ministry of the Environment:	No. 65
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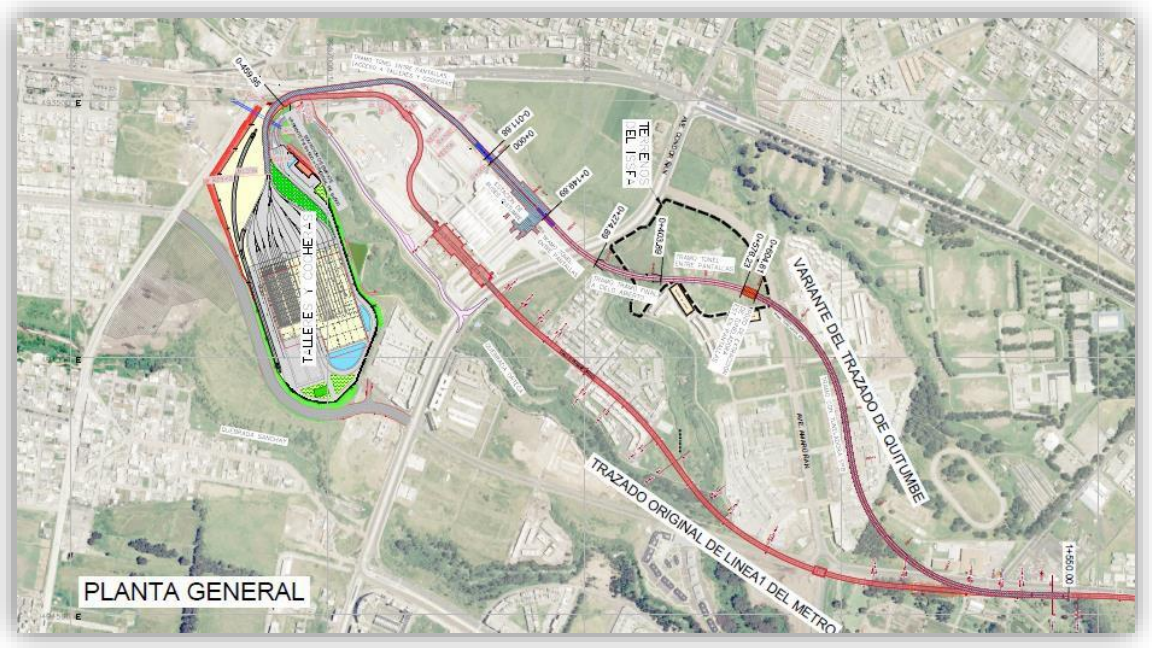
3. PROJECT DESCRIPTION

The proposed alternative maintains the length of 2.6 km, from Quitumbe Station to its link with Morán Valverde Station.

Illustration 1.1: *Map of 2.6-km Quitumbe Alternative*



Source: Empresa Pública Metropolitana Metro de Quito, 2016.

The layout of the proposed Quitumbe Alternative includes 2.6 km. From PK 9 + 500 to PK 10 + 600 (1.1 km), the typology is a tunnel between temporary walls. Between PK 10 + 320 and PK 10 + 400, the Rumichaca stream will be temporarily channeled for a return period of 500 years. This section will be executed in a false tunnel (i.e., in the open) with reinforced concrete walls and roof. At PK 10 + 600, extraction well 1 of the tunneling machine coming from Solanda Station will be executed. From PK 10 + 600 to PK 11 + 600 (intersection with Morán Valverde Station), the typology is tunneling with EPB- (Earth Pressure Balance) type TBM (Tunnel Boring Machine).

a. Preliminary activities

Prior to construction, the following activities will be carried out:

- ✓ Inspection;
- ✓ Withdrawal of property and infrastructure (if applicable);
- ✓ Relocation of infrastructure and properties;
- ✓ Appraisal of properties affected by construction;
- ✓ Adaptation and use of machinery yards (if applicable);
- ✓ Adaptation and use of auxiliary facilities;
- ✓ Adaptation and use of work camps; and
- ✓ Water supply, energy and other services.

b. Auscultation (Monitoring) Plan

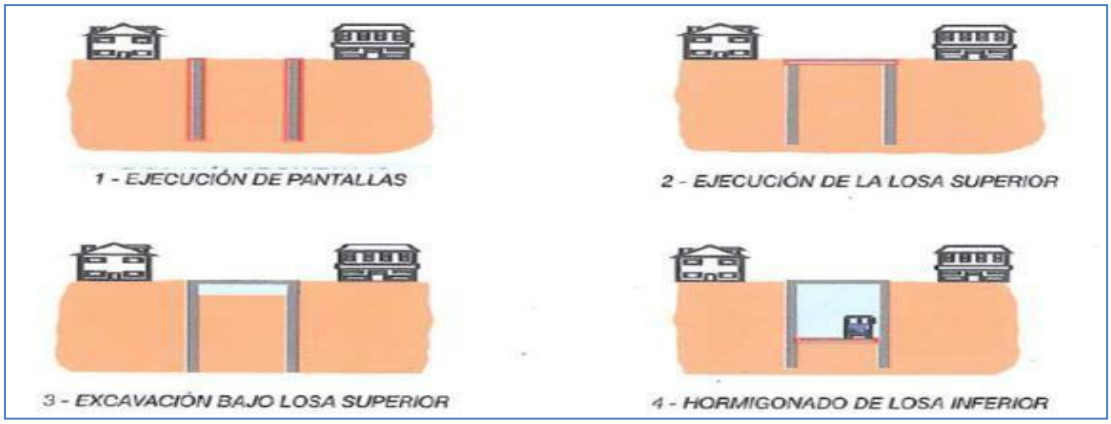
A simple, precise and effective auscultation system will be established for the projected work. The aim of this system will be to control the movements of works in execution, as well as their degree of influence on the environment, during the different construction phases, and to ensure their adaptation. In order to meet these objectives, auscultation devices and systems must be projected, at all times, to report the response of the terrain, structures and facilities to the different construction phases.

c. Construction Phase

Construction process between walls

From PK 9 + 500 to PK 10 + 600 (1.1 km), the typology is tunneling between walls. This methodology comprises the execution of diaphragm walls inside the terrain, with subsequent execution of slabs and excavation between walls, thus forming the tunnel.

Illustration 3.1. Sequence of the process



Source: ESIA and PMA Primera Línea del Metro de Quito, 2013

Channeling of Rumichaca River

Between PK 10 + 320 and PK 10 + 400, the Rumichaca stream will be channeled for a return period of 500 years. This section will be executed in a false tunnel, i.e., in the open but covered with reinforced concrete walls and roof.

EPB-type TBM (Tunnel Boring Machine)

Earth Pressure Balance (EPB) methodology consists of balancing the pressure of the earth front with back pressure provided by the excavated earth itself and housed in an interior chamber of the machine and just behind the cutting head, at the same time as the torque, together with the thrust of the hydraulic jacks (pushing force), generate the movement of the machine and consequently the excavation of the tunnel. The final lining rings of the tunnel are placed right after the excavation of an advanced section.

Superstructure

The type of track to be adopted is one with an international gauge track (s = 1,435 mm), on a plate with prefabricated concrete blocks, embedded in elastomer and composed of the following elements:

- Lane UIC 54 E1;
- Fastening system;
- Elastic concrete block; and
- Elastomer

Construction of the station

The layout of the 2.6-km alternative comprises Quitumbe Station, which, like all the stations, has been designed with a useful platform length of 115 m and allows operation with six-car train compositions. Both the stations and the reserves are located on the layout in horizontal sections and on straight lines.

Cut-and-cover system

The execution comprises the following phases:

- Execution of side walls;
- Excavation between walls up to the top slab level and execution of the same;
- Replacement of surface use and excavation under slab; and
- Execution of counter vault

Basic Design of the Facilities System

The following describes each of the systems that are part of the railway installations. Railway signaling;

1. Electrical substations;
3. Energy distribution;
4. Electrification;
5. System for control and sale of titles;
6. Escalators and elevators;
7. Fire-protection system;
8. Ventilation;
9. Communications and radio telephony;
10. Station control; and
11. Central control station

d. Operation and Maintenance Phase

After the construction of the infrastructure, the operation and maintenance phase of Quito Metro Line One will begin. In turn, this phase may be divided into three sub-phases:

1. Testing and inspection of equipment, and commissioning;
2. Ordinary operation; and
3. Maintenance of equipment and facilities

Because the scope of this ESIA is only for the construction of the Quitumbe Alternative, there will be no different or new associated environmental and social impacts corresponding to the operation and maintenance of this section.

e. TBM (Tunnel Boring Machine) Closure and Rehabilitation Phase

The project has an estimated useful life of 150 years and will become the city's main metropolitan transport system. In the auxiliary areas, the closing phase will be considered as the moment in which this system ceases to be used, for which the existing structures in the prefabricated areas (viaducts) will be dismantled and transferred to other areas or sites in other projects, by its owners, while the material dumping areas will be reconditioned and used by their owners for other projects. Two key activities are established for this purpose: (i) the withdrawal of equipment, machinery, temporary camps and installations; and (ii) temporary infrastructure after construction.

4. ANALYSIS OF ADVANTAGES AND DISADVANTAGES OF THE PROPOSED ALTERNATIVE

The following are the estimated advantages and disadvantages of the original route as proposed in the original and approved Project ESIA (Alternative 1) and proposed alternative route as presented in this ESIA (Alternative 2) alternatives to environmental, social, technical and economic criteria.

Alternatives	Alternative description	Advantages	Disadvantages
Alternative 1	Execution of Original layout for the Quitumbe section–Morán Valverde	Benefits for the community regarding alternatives for mobility	Interference of vehicular traffic in the area of existing bus parking
		Direct connection between interprovincial buses and the Quitumbe Metro Station; ease for users	Interference between extraction well 1 and the Poliducto, Oleoducto (SOTE) and Water Pipelines
			Extraction of the TBM at this site would cause diversion of considerable traffic in terms of scale and time
			Interruption in vehicular income of the housing complexes on Pumapungo Street; 300 families affected
			The original route crosses Quebrada Ortega–Rumichaca–Pumapungo, for which a large-scale tricellular frame is projected, with the inconvenience that a work of this magnitude entails
			Impact on the area in environmental recovery of the linear park located next to the Solidaridad group Stages II, III, IV and V, where 250 individual trees are well conserved
Alternative 2	Execution of layout of the alternative for the Quitumbe–Morán Valverde section	Neither the vehicular traffic of the Pumapungo Street housing complexes nor the interprovincial station's bus parking is affected	Impact of Condor Ñan Avenue just after Quitumbe Metro Station and effect on Simón Bolívar Avenue
		The routing of the Rumichaca stream, through a bi-cellular framework, which will channel the stream for a return period of 500 years	Affected due to Quitumbe Station construction activities
		The distance between the extraction well 1 and the SOTE, Poliducto and Piñera Ambiental pipelines is 68 m, which reduces interference	Intersection with riverine protection

		In the surface part of the route, there will be no effect on sets of residential areas located in the area (Paraíso del Sur Complex and others); the layout is underground	

Analysis of advantages and disadvantages of alternatives. Prepared by Ecosambito, 2016.

This matrix demonstrates that the original layout of the Metro from the Patio de Cocheras to Morán Valverde Station presents a significantly greater effect on biotic and social components. In terms of the ESIA's quantitative ratings (the higher the value, the more viable the alternative: Alternative 1 versus Alternative 2), the environmental rating was 1.2 versus 2.44, the social rating was 4.07 versus 4.16, and the technical-economic rating was 1.05 versus 1.13. Because the execution of the layout of the 2.6-km Quitumbe Alternative of Quito Metro Line One significantly reduces these effects, it may be concluded that Alternative 2 is more viable for execution.

The following are some of the key aspects of the proposed alternative route: (i) the original layout's design connects Quitumbe Station with the Patio de Cocheras, crossing through the existing bus parking area, which would create major interference because the proposed construction is by cut and fill; (ii) the original route includes Extraction Well 1 of the tunnel boring machine that comes from Solanda Station, in the roundabout of Rumichaca Avenue and Amaru Ñan, through which three pipelines pass: Poliducto (multi-purpose pipeline), Oleoducto (oil pipeline)- SOTE and Ambiental (water pipeline). The original design creates an interference between the extraction well and the abovementioned pipes; (iii) the original proposed works would require a considerable deviation of traffic in terms of area and time; (iv) the original route crosses the residential complexes of Pumapungo Street, which would cause inconvenience to residents due to cut-and-fill construction on a narrow street that serves as access to homes, also affecting the only access to the housing complex's parking lot; and (v) the original route crosses the Quebrada Ortega–Rumichaca–Pumapungo, for which a large-scale tricellular frame is projected, with the inconvenience that a drainage work of this magnitude entails.

5. BASELINE

The baseline for this ESIA is the Environmental Impact Study of Quito Metro Line One executed in 2013. This ESIA presents an update of the biotic, physical (monitoring of water, soil, air, noise and vibrations) and socioeconomic components for the specific area of influence of this proposed alternative. The work was carried out by a multidisciplinary team with several years of experience in the development of environmental studies; part of the team updated the Environmental Management Plan of the study conducted in 2013. The analyses and measurements were carried out by laboratories duly accredited in the Ecuadoran Accreditation Service (*Servicio de Acreditación Ecuatoriano,* SAE).

The area of biotic, physical and social influence was identified. For each case, an area that will be affected by project activities has been defined. It is important to emphasize that 97 percent of the activities are underground and three percent are on the surface (Quitumbe Station). No significant changes from this baseline work were detected from those in the environmental conditions presented in the original project ESIA. Based upon the ESIA, no significant critical natural habitats or natural habitats are present and no physical cultural resources are present in the direct area of influence.

6. EVALUATION OF ENVIRONMENTAL IMPACTS AND RISK ANALYSIS

6.1 Matrix evaluation of the construction phase

In order to identify the importance value of the impacts generated for the construction phase, impact

matrixes were generated for each of the generated activities, with the following main results:

- In the preparation activity, two moderately significant negative impacts were identified, referring to the modification of land and landscape use, due to the relocation of infrastructure and services to prepare the area for the execution of the subsequent activity; irrelevant impacts are seen in the other factors evaluated because no construction is carried out in the preparation.
- In the tunnel construction activity, four factors were found to be mildly affected, i.e., they were classified as Moderately Significant. These factors are directly related to water and soil resources because excavation and debris removal actions are involved. Therefore, the landscape will be modified.
- In the Quitumbe Station construction activity, moderate negative effects on the environment are observed in most of the evaluated factors, because 11 of them have a Moderately Significant rating. This is because the landscape and its components will be directly impacted, whether for land moving, water drainage, construction of the infrastructure itself, or waste generation.
- In the auxiliary activities corresponding to this phase of the project, nine factors classified as negative and with a Moderately Significant impact were determined, because the auxiliary activities are involved in waste accumulation, transport, and chemical handling facilities, in addition to the traffic interruptions and deviations in the sector.

As a result of the evaluation in the construction phase, a negative overall value of 22.5 indicates that the importance is defined as irrelevant, without affecting the current conditions of the area of influence on a large scale.

The proposed construction does not involve any significant impacts on critical or natural habitats, on physical cultural resources, or the use of pesticides.

No significant labor influx is needed for the construction since the project is based in Quito and sufficient local workforce is available. There are 4950 local workers, less than 50 foreigners. Only labor influx corresponds to manager positions of the contractor, and international management firms; workers are hired locally. The main contractor has more than 95 subcontractors, most of them local. The project is located in an urban setting with no labor camps, so there is no risk of negative labor influx. The labor influx is minimal and the city has a large capacity to absorb this number of workers.

The first phase of construction (which involved the construction El Labrador and La Magdalena Multimodal Stations and preparation of the grounds and parking lots, mainly) required the expropriation and donation of land areas located in Quitumbe, La Magdalena and El Labrador. Phase two of construction also required land acquisition in the area of Quitumbe in 2016. Through a land acquisition process, public and private properties were transferred and expropriated in the area of Quitumbe to the Municipality of the Metropolitan District of Quito (MDMQ) in 2013 and 2016.

According to PEGASSH, EPMMQ ensures compliance with standards of conduct and gender equity through its Contractor, who hires most of the project's workers. ACCIONA's Gender Equity Policy establishes that: ACCIONA rejects any manifestation of physical, psychological, moral harassment or abuse of authority, as well as any other conduct that may create an intimidating or offensive environment, and promotes working conditions that prevent harassment in all its forms, including sex-based and sexual harassment. The code of conduct can be found at the following link: https://accionacorp.blob.core.windows.net/media/2055850/acciona_codigo_conducta.pdf.

Additionally, any concerns or complaints regarding compliance with standards of conduct, gender equity and gender based violence such as physical, psychological, moral harassment or abuse of authority can be channeled to the Grievance Redress Mechanism (GRM), that is available to all

project workers and community.

6.2 Evaluation of the matrixes by the operation and maintenance phase

During the operation and maintenance phase of the project, the following activities were evaluated:

- In the operation of the project activity, one significant positive impact was determined regarding the sector's transportation and mobility, due to the fact that Quito Metro will be in operation and represents a means of mass transportation for citizens, improving their quality of life and reducing travel times to different sectors of the city. Four Moderately Significant impacts and two Irrelevant impacts of a negative nature were also determined. Operation of Quitumbe Station will have the common problems of establishing a public space, such as waste generation, noise, etc.
- In the maintenance activity, one significant Moderate positive impact was obtained, related to the area's transport and mobilitydue to improved traffic movement. . All the other environmental factors evaluated were classified as Irrelevant because the impact on the environmental factors evaluated will be minimal and will have already been taken into account in the project's construction phase.
- The auxiliary activities showed that the impact's significance is Irrelevant because there will be a minimum of personnel hirings and quantities of waste generated will be low.

As a result of the evaluation in the operation and maintenance phase, a negative overall value of 23 indicates that the significance is Irrelevant.

6.3 Evaluation of the evaluation matrix by the closing phase

In the closing phase of the project, there will be an irrelevant effect on the environmental factors evaluated. A negative overall value of 21 means that, in the dismantling of structures and the removal of equipment, machinery, camps, auxiliary areas, etc., there will be no direct effects on the environmental factors evaluated. It must be taken into account that the presence of said infrastructure during the construction and operation phases caused alterations to the environment.

6.4 Risk analysis

In relation to the process's risks to the environment, specifically for fires, fuel spills, and electricity, these have been classified as low due to the project's conditions (i.e., a new project) and the safety conditions that will be handled in the project's development, thus decreasing the likelihood that these types of risks may occur.

The area where work will be performed presents a volcanic risk if a volcano that is located in the area of influence erupts and the wind direction transports the material to the project sector. This same area is exposed to seismic risk if an earthquake occurs in the epicenter while project activities are being executed in nearby areas, with magnitudes similar or superior to those recorded in the country's seismic history.

Due to the characteristics of the area where the project will be developed, no biotic risks from the process to the environment or vice versa have been identified.

Social risks have been identified as Low, with a low probability of occurrence and with minor consequences should they arise. This will depend on the proper management of the community relations department in relation to the project's dissemination.

7. MANAGEMENT PLAN

The original Environmental Management Plan was presented to the Ministry of Environment authority in the "Environmental Impact Study (EsIA) and Environmental Management Plan (PMA) for the Quito Metro Line One Project (2013)" carried out by Gesambconsult Cía. Ltda. Taking into account the 22 km that cover the entire line crossing Quito and the 15 designed stations, an update was also made to the Environmental Management Plan that was approved by the Ministry of the Environment by Official Letter No. MAE-SCA-2015-3179 of October 7, 2015.

This Complementary ESIA includes a 2.6-km variation in the section from the Patio de Cocheras to its junction with Morán Valverde Station, and also includes construction and operational activities already considered in the original section. It is important to emphasize that the measures would correspond to an Environmental Management Plan for the 2.6-km Quitumbe Alternative section. These were already established in the EsIA Management Plan approved in 2013 and updated to 2015. Table 1 presents a summary/list of the management plan/programs.

Table 1. Summary of management plans

ENVIRONMENTAL MANAGEMENT PLAN

Impact Prevention and Mitigation Plan
- Measures for the control of air pollution by particulate matter
- Measures for the control of air pollution by gas emissions
- Measures for noise control
- Measures for the control of vibrations
- Preventive measures for soil contamination
- Corrective measures for remediation of contaminated soils
- Plan for prevention and mitigation of impacts on water component
- Plan for prevention and mitigation of impacts on urban mobility and accessibility
- Plan for prevention and mitigation of landscaping impacts

Waste Management Plan
- Waste collection and segregation
- Temporary storage
- Organic waste
- Stripping of materials
- Tunnel excavation materials
- Non-recyclable/non-hazardous waste
- Recyclable waste
- Dangerous residues
- Special waste
  - Treatment
  - Final disposal
  - Transport of waste

Industrial Safety and Occupational Health Plan
- Industrial Safety and Occupational Health Policy
- Protection of workers' health: Affiliation of staff with IESS[1]
- Safety and communications meetings
- Reports and investigation of accidents and incidents
- Responsibilities and obligations
- Formation of the Occupational Safety and Health Committee

[1] Intituto Ecuatoriano de Seguridad Social (Social Secutiry Ecuadorian Institute)

Identification of risks and associated prevention measures
Regulations
Safety education
Hygiene measures and vector control
Rules for order and cleanliness
Exposure to noise and vibrations at work
Exposure to polluting substances in the workplace
Handling of combustible and flammable liquids and toxic substances
Special procedures
Work with electrical networks
Operation with heavy machinery
Work with elevation machinery
Excavations
Micro-environment safety in the workplace
Personal protective equipment
Signaling
Fire protection and prevention

Contingency Plan and Emergency Response

Staff and brigade training
Basic policies
Compliance with regulations and use of best practices
Action priorities
Organization of the plan
Measures for prevention and containment of spills in the workplace
Fire-fighting equipment
Loading and unloading facilities
Spill-control equipment
Communication and alarm systems
First aid and personal protection equipment
Inspection, testing and maintenance of equipment
Access to communication or alarm systems
Space requirement
Agreements with authorities
Equipment failures
Emergency response measures for the workplace
Safety forecasts for the workplace
General procedure for emergency actions
Procedure for action in fuel or lubricant spills
Procedure for action in case of fire outbreak
Procedure for action in case of fire
Procedure for action in case of minor accidents (bruises and cuts)
Procedure for action in case of minor work-related accidents
Management of chemical substances
Procedure for action in case of major accidents (unconsciousness, bleeding, intense pain, etcetera)
Procedure for action in case of risk-related minor occupational accidents
Procedure for action in case of explosions
Procedure for action in case of impact on infrastructure during underground excavations
Procedure for action if contaminated soils are left during tunnel excavation
Procedure for action in case of natural phenomena: volcanic eruptions
Procedure for action in case of natural phenomena: earthquakes

Equipment and materials for control of workplace emergencies

Worker training and drill program

Community Relations Plan

- Community Relations Plan programs
- Agreement program and claims management
  - Measures for claims management
  - Measures for agreements
- Community Relations Program
- Information and Monitoring Program

Environmental Training Plan

- Aspects and activities of the plan
- Environmental issues
- Industrial safety topics
- Environmental awareness and information for the public
- Trainers
- Training methodology

Rehabilitation Plan for Affected Areas

- Measures for the rehabilitation of residential areas, houses or iconic buildings

Monitoring and Monitoring Plan

- Structure of the Monitoring Plan
- Monitoring Program for the Implementation of the Plan for the Prevention and Mitigation of Environmental Impacts
- Air-quality Monitoring Program
- Noise-monitoring Program
- Vibration-level Monitoring Program
- Surface Water Quality Monitoring Program
- Soil Monitoring Program
- Monitoring Program on Impact on Urban Mobility and Accessibility
- Program for Monitoring and Control of Landscape Impacts

Closure and Abandonment Plan

- Closure and abandonment of worksites
- Closure and abandonment of construction phase

Impact Prevention and Mitigation Plan

- Plan for the prevention and reduction of air pollution, noise and vibrations
  - Measures for control of air pollution from emission of suspended particles
  - Measures for control of air pollution from gas emissions
  - Measures for noise control
  - Measures for control of vibrations
- Plan for prevention and mitigation of soil contamination
- Prevention and mitigation of water impact plan
- Plan for prevention and mitigation of the deterioration of mobility and urban accessibility

Contingency plan and emergency response

The ESIA includes a description of the estimated budget and responsibilities for these plans/programs. The construction contractor is responsible for the implementation of these plans including their costs, as part of their concession contract. EPMMQ maintains overall responsibility given their role as project owner.

8. CONSULTATION PROCESS

The social participation of the draft EIA for the Quitumbe Alternative of 2.6 Km. of the Quito Metro Line One was carried out between November 29 and December 9, 2016. It complies with the Ecuadorian Regulations for the Application of Mechanisms of Social Participation established in the

Environmental Management Law and its respective Application Instructions, Ministerial Agreement No. 103, of 2015. The social actors in the area of influence include residents and institutional actors: settlements La Concordia 1, Solidaridad Quitumbe Etapa II and III, and Condominio Paraíso de Sur; and several organizations, such as Public Transport Company Distrito Sur - DISUTRANS SA, Metropolitan Transit Agency, Metropolitan Mobility and Public Works Company, as well as hospitals, schools and commercial organizations, among others. In terms of institutional actors, 13 representatives were invited, including the Provincial Mayor and the Vice Provincial Mayor, the Minister of the Environment, the Provincial Director of the Environment of Pichincha, the Director of the Pichincha Province Government, and several representatives of the Municipal Government of Quito, including the Mayor, the Vice Mayor, among others.

The Public Hearings for the presentation of the Draft Complementary EIA were held On December 7, 8 and 9, 2016, in the three settlements identified (Concordia, Solidaridad Quitumbe, and Condominio Paraíso de Sur, respectively). The events announced through personal invitations delivered 7 days in advance (67 invitations, to residents of the area and authorities), public radio (*Diario Ultimas Noticias*) and written press. Two Public Information Centers were also installed from November 29 to December 5, 2016, in Las Cuadras Park and in the Paraiso Sur Housing Complex. In addition, information were also published on the web pages https://maecalidadambiental.wordpress.com and http://www.metrodequito.gob.ec, between November 29 to December 9, 2016. Comments and suggestions were collected in the Public Hearings, and in the records available in the Public Information Centers, and through the electronic mail tnunez@sambito.com.ec. During the Public Presentations, forty-seven (47) observations / concerns were recorded. Additionally, one hundred (100) manifestations were registered in the Public Information Centers. No observations were recorded in the email enabled. The main concerns expressed by the participants and the corresponding responses are summarized below.

In La Concordia, the main concerns were regarding noise impacts and potential damage from vibrations during construction, access to the Metro from the Quitumbe terminal, access to the Metro through public transportation, and no need to use personal vehicles, and direct pedestrian access to the Metro in Concordia.

In Solidarity Quitumbe, community concerns were with the impacts to the streams ("Quebradas" Carmen, Ortega and Rumichaca) where they claim to be home to native, endemic, medicinal and edible plants that have been the object of rehabilitation initiatives by the area residents. Specifically, some participants expressed that the project would have impacts on the local flora. Other concerns were potential impacts of construction, such as dust and noise, and how such impacts will be mitigated. There were also concerns about the closure of streets in that sector without leaving alternate streets, which would create traffic problems especially on holidays. Comments were also made on how socialization was carried out and mentioned that the day and time of the event was not adequate, resulting in limited participation (as it should be held on weekends and after 7:30 p.m., when people arrive from work). It was discussed that when the representatives of the community sent the request to change the crossing through the Pumapongo, they have specified the need for broad socialization, guarantees and compensations. In addition, participants also expressed concerns with other issues such as lack of lighting, citizen insecurity, garbage collection, etc. (although these were not the subject of the Public Hearing).

In the Paraíso del Sur Complex, concerns were mostly about the depth of the excavations and the tunnels, and their impacts on the houses in the area of influence, not only during construction but also during the operation of the Metro. Participants also raised questions about the guarantees that Metro would correct damage to their homes, in case they were to occur.

On the issue of noise impacts and damages from vibration, the project EIA consultants and project proponents explained that seven alternatives were studied and that the selected route meets the conditions to avoid any type of inconvenience at the surface and depth levels, and to ensure that the

houses will not suffer any type of impact. The construction method ("cut and cover") also prevents such impacts, and that boring machines will be used at 18 meters depth, thus avoiding impacts to the houses. Regarding the guarantees of correction of possible damages, the Proponent explained that Metro will perform precautionary inspections (prior to the start of construction) and that the results will be notarized and delivered to the owners. The document will serve as a safeguard for them and for the Metro, in case of potential damage, as owners could use it in case of damages to determine those attributable to Metro. In terms of access to the Metro stations, the Proponent ensured that all Metro stations are multi-modal and have access through public transportation and that none will require the use of private vehicles to access it. However, they clarified that pedestrian access was not possible from Concordia, but that it will be accessible by the bus system.

Regarding the impacts on the flora and the streams in Solidarity Quitumbe, the consultants thanked the information and committed to the flora studies of the streams. Regarding the compensations requested, the Proponent explained that for public works in Quito legislation does not include the concept of compensations, but assured that all technical studies are being performed to ensure that there will be no impacts during construction, particularly from the tunneling machine, and that any damage will be 100 % repaired.

Events are recorded in photographs, audio and video. The pertinent observations and requirements were incorporated into the EIA and its Environmental Management Plan.