



## PRIMERA LINEA DEL METRO DE BOGOTÁ



# EXECUTIVE SUMMARY - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE RELOCATION, PROTECTION AND HANDLING OF PLMB NETWORKS



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# 1 INTRODUCCIÓN

The Bogotá Metro Company (EMB) and the METRO LÍNEA 1 SAS (ML1) Concessionaire, signed Concession Contract No. 163 of 2019 for the construction, operation and maintenance of the First Line of the Bogotá DC Metro (PLMB), whose Initiation act was signed on October 20, 2020.

The purpose of the contract is "the granting of a concession so that, in accordance with the provisions, the Concessionaire, on its own account and risk, carries out all the activities necessary for financing, detailed studies and designs, execution of construction, works of the previous phase, building works, works for networks in charge of the Concessionaire, works to adapt and repair diversions, works for special intersections, the operation and maintenance of the project, social and environmental management, partial reversal and the reversion of the infrastructure corresponding to the PLMB, as well as the financing, design, installation, supply, individual and group tests, certifications, commissioning, operation, replacement, maintenance and reversion of the rolling stock and the Metro-Railway systems and the provision of the public passenger rail transport service in Bogotá, through the PLMB".

The Concession Agreement is divided into three (3) stages, which in turn are structured in phases, as follows:

- Preoperative Stage: Divided into the following Phases:
  - Preliminary Phase (estimated duration: 810 days)
  - Construction Phase (estimated duration: 1710 days)
  - Testing, Certification and Commissioning Phase (estimated duration: 180 days)
- Operation and Maintenance Stage: Begins with the signing of the Certificate of completion of the Testing, Certification and Commissioning Phase and extends until the date of completion of the Operation and Maintenance stage.
- Reversion Stage: Begins with the conclusion of the Operation and Maintenance stage and concludes with the signing of the Reversion Act.

For the preparation of Environmental Studies; The METRO LÍNEA 1 SAS (ML1) Concessionaire, signed the Consulting Agreement METRO1-CS-E-210421, with the Metro Bogotá L1 Environmental Consortium, on April 21, 2021, including the present Environmental and Social Management Plan - PMAS for the Plan for the transfer, protection, relocation and/or network management of the PLMB, an activity that will be initiated by the ML1 Concessionaire during the preliminary phase (810 days) – pre-operational phase.

In accordance with the foregoing, and with what is stated in Technical Appendix 15, Environmental Management and Occupational Health and Safety, Chapter three (3) Number 3.1, which establishes "Obligations during the Previous Phase: Literal (a) Adjustments, complementation , update and implementation of the Environmental and Social Management Plan of the PLMB for Multilateral Entities



and the Monitoring and Follow-up Plan of the PLMB for Multilateral Entities for all works executed during the Preliminary Phase", this document contains the chapters related to the Environmental and Social Management Plan – PMAS and the Monitoring and Follow-up Plan for the transfer of networks in the corridor of the First Line of the Bogotá Metro, which the Concessionaire will implement in the development of the activities.

The PMAS executive summary is structured as indicated inTable 1:

#### Table 1– General Structure of the PMAS

| Chapter | Name   | Description  |  |
|---------|--|--|--|
| 1       | INTRODUCTION                                 | It includes the Purpose of Concession Contract 163 of 2019<br>and its stages, the company in charge of preparing the PMAS<br>and the general structure of the PMAS for the transfer,<br>protection, relocation and/or management of PLMB networks.   |  |
| 2       | OBJECTIVES                                   | It describes the general objective and the specific objectives<br>that must be achieved in the elaboration of the PMAS for the<br>transfer of PLMB networks.   |  |
| 3       | SCOPE  | It describes the area, the activities and the duration of the works in which the Network PMAS will be applied.   |  |
| 4       | DEFINITIONS AND ABBREVIATIONS                | It describes the definitions necessary for understanding the document, as well as the abbreviations used.  |  |
| 5       | RESPONSIBLE                                  | Describes the main structure of the Environmental area of the Concessionaire and the Contractor that will execute the Work.  |  |
| 6       | REFERENCES                                   | Describe the contractual references, national and international regulations and documents that apply to the project.   |  |
| 7       | ABIOTIC AND BIOTIC ENVIRONMENTAL DEVELOPMENT |  |  |
| 7.1     | Description and location of the<br>Works     | It describes the location of the works, the work activities that<br>will be carried out with their technical and construction details,<br>resources, environmental components that have an impact,<br>and programs that will be applied for the prevention, control,<br>mitigation, and compensation of environmental impacts. |  |
| 7.2     | Areas of influence                           | Describes the identification, delimitation and definition of the areas of direct and indirect influence and the methodology by which it was determined.  |  |
| 7.3     | Characterization                             | Describe the current conditions of the media: abiotic and biotic of the area where the project is carried out.   |  |
| 7.3.1   | Characterization of the abiotic medium       | Contains the baseline of the geospheric hydrospheric and atmospheric components  |  |
| 7.3.2   | Characterization of the biotic environment   | Contains the base line of the flora and fauna components   |  |



#### EXECUTIVE SUMMARY - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE TRANSFER, PROTECTION, RELOCATION AND/OR NETWORK MANAGEMENT OF THE PLMB

| Chapter | Name  | Description  |  |  |
|---------|---|--|--|--|
| 7.3.3   | Environmental and management zoning                                     | It presents the environmental zoning, the result of the characterizations carried out, and the management zoning.  |  |  |
| 7.4     | Demand, use, exploitation<br>and/or affectation of natural<br>resources | It details the characterization of the renewable natural resources that the project will require and that will be used, exploited or affected during the execution of the works for the transfer of PLMB networks.                             |  |  |
| 7.5     | Identification and evaluation of<br>environmental impacts and<br>risks  | It presents for the abiotic and biotic environments the identification and analysis of environmental impacts and risks associated with each of the construction activities of the transfer of PLMB networks.                                   |  |  |
| 7.6     | Environmental Management<br>Programs                                    | Indicates the management measures that will be<br>implemented to prevent, control, mitigate and compensate the<br>environmental impacts identified for the abiotic and biotic<br>media.  |  |  |
| 7.7     | Follow-up and Environmental<br>Monitoring Plan                          | It details the follow-up and monitoring actions that must be<br>implemented in order to guarantee compliance with the<br>implemented management measures.  |  |  |
| 7.8     | Occupational Health and Safety<br>Management System                     | Describes the system designed by ML1 to manage the health and safety risks of its workers and contractors.   |  |  |
| 7.9     | Risk and Disaster Management<br>Plan                                    | Describes the analysis and assessment of the risks derived<br>from threats of natural, anthropic, socio-natural and<br>operational origin related to the activities to be carried out for<br>the transfer of PLMB networks.                    |  |  |
| 7.10    | biosafety protocol  | Presents the general biosafety protocol to mitigate, control<br>and properly manage the COVID-19 coronavirus pandemic to<br>reduce the risk of exposure and contagion due to acute<br>respiratory infection caused by SARS 2 CoV-2 (COVID-19). |  |  |
| 8       | AVERAGE SOCIOECONOMIC   | DEVELOPMENT  |  |  |
| 8.1     | Responsible   | Describes the main structure of the Social area of the Concessionaire and the Contractor that will execute the Work.   |  |  |
| 8.2     | Areas of influence  | Describes the identification, delimitation and definition of the areas of direct and indirect influence of the Socioeconomic environment and the methodology by which it was determined.   |  |  |
| 8.3     | Characterization  | Describes the characteristics of the socioeconomic environment of the area of influence.   |  |  |
| 8.4     | Identification, analysis and evaluation of social impacts               | Presents for the socioeconomic environment the identification<br>and analysis of impacts and social risks associated with each<br>of the construction activities for the transfer of PLMB networks   |  |  |
| 8.5     | Social management programs  | Describes management measures for the socioeconomic<br>environment that will be implemented to prevent, control,<br>mitigate and compensate for the identified social impacts.   |  |  |



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| Chapter | Name                          | Description  |
|---------|-------------------------------|--|
| 8.6     | Follow-up and monitoring plan | Describes the follow-up and monitoring activities that will be<br>implemented to guarantee compliance with the proposed<br>social management measures. |
|         | CONCLUSIONS                   | It presents the brief arguments of the scope and results of each chapter. These are presented at the end of each Volume.                               |
|         | BIBLIOGRAPHY                  | Summarize the bibliographic references from which the basic information was obtained.  |
|         | ANNEXES                       | Includes all supports and evidence related to each chapter.  |



# 2 OBJECTIVES

The general objective of the PMAS for the activities of the plan for the transfer, protection, relocation and/or management of the service networks to be carried out in the preliminary phase of the project First Line of the Bogotá Metro (PMLB) is to have an instrument for the management environmental, social and occupational health and safety that allows: to prevent, mitigate, correct and/or compensate for negative socio-environmental impacts and manage occupational health and safety risks; complying with the contractual requirements (Technical Appendix No.15), with the applicable national and local regulations and with the environmental, social and health and safety safeguards at work of the Multilateral Entities.

The specific objectives of this study are:

- Present the location of the intervention areas taking into account the abiotic, biotic and socioeconomic means.
- Describe the construction activities to be developed in the PLMB plan for transfer, protection, location, and/or network management.
- Define the applicable regulatory framework and the environmental permits necessary for the development of the project in accordance with the activities to be carried out.
- Define and characterize the areas of influence according to the manifestation of significant environmental impacts in the abiotic, biotic and socioeconomic environments.
- Establish the environmental and management zoning for the project, based on the environmental and social elements identified within the area.
- Assess the environmental and social impacts and risks that could arise from the construction activities required for the plan of transfer, protection, location, and/or network management of PLMB and define the measures that allow compliance with the Bank's safeguard policies. Multilateral.
- Define management Plans and Programs to prevent, mitigate, correct and/or compensate for negative environmental and social impacts that the project may generate and minimize risks to occupational health and safety.
- Establish follow-up and monitoring programs in order to evaluate the effectiveness of the environmental management measures established in the programs and carry out the necessary improvement actions.
- Guarantee compliance with applicable national regulations and safeguard policies of Multilateral Banking by the project, its contractors and suppliers.
- Define a schedule and a budget that ensures the availability of the necessary resources for the implementation of the PMAS in compliance with national regulations and the safeguard policies of Multilateral Banking.



Process before the competent environmental authorities the environmental permits required for the execution of the project.

Finally, it is emphasized that for the activities related to the Environmental and Social Management Plan - PMAS for the Plan of transfer, protection, relocation and/or network management, the required procedures and/or permits will be initiated and among them, those referring to the forestry component and intervention to the water round, in advance of the viaduct works, initially requesting only for forestry individuals and bodies of water that could be affected by the activity.



# 3 SCOPE AND METHODOLOGY

### 3.1 SCOPE

The PMAS applies to the works of the transfer plan, protection, relocation and/or management of service networks, both wet and dry, that interfere with the works of the First Metro Line of Bogotá - PLMB; in the corridor comprised between: Canal Tintal II at the height of Calle 43 south with Carrera 97C and Carrera 20 Avenue (Paseo de los Libertadores Avenue) with Calle 80; in the previous phase.

The corridor where the networks will be moved has an approximate length of 22.2 kilometers and is divided into six (6) sections, along the following nine (9) locations: Bosa, Kennedy, Puente Aranda, Los Mártires, Antonio Nariño, Chapinero, Teusaquillo, Santafe and Barrios Unidos.

Then in Table 2 general information of each section is presented.

| Section   | abscissed |  | Addresses   |   | Longth (m) |
|---|-----------|--|---|---|------------|
| Section   | Since     | Until  | Since   | Until   | Length (m) |
| Section 1 km 0+000 km 3+700 Cd (0<br>hu<br>A<br>(/<br>V |           | Canal Cundinamarca<br>(Carrera 109) at the<br>height of Avenida<br>calle 54 sur,<br>connecting with<br>Avenida calle 43 sur<br>(Avenida Ciudad de<br>Villavicencio). | South 43rd Street<br>Avenue (City of<br>Villavicencio Avenue)<br>with Carrera 86<br>Avenue (Cali City<br>Avenue). | 3,699   |            |
| Section 2   | km 3+700  | km 8+250   | South 43rd Street<br>Avenue (City of<br>Villavicencio Avenue)<br>with Carrera 86<br>Avenue (Cali City<br>Avenue). | Avenida Calle 26 Sur<br>(Avenida Primero de<br>Mayo) with Carrera<br>71 F.                      | 4,549      |
| Section 3   | km 8+250  | km 12+550  | Avenida Calle 26 Sur<br>(Avenida Primero de<br>Mayo) with Carrera<br>71 F.  | Carrera 30 Avenue<br>(Avenida Ciudad de<br>Quito) with Calle 8<br>Sur (Avenida Fucha).          | 4,323      |
| Section 4   | km 12+550 | km 16+400  | Carrera 30 Avenue<br>(Avenida Ciudad de<br>Quito) with Calle 8<br>Sur (Avenida Fucha).                            | Carrera 14 (Avenida<br>Caracas) with Calle<br>13 (Avenida<br>Jiménez).                          | 3,825      |
| Section 5   | km 16+400 | km 19+900  | Carrera 14 (Avenida<br>Caracas) with Calle<br>13 (Avenida<br>Jiménez).  | Carrera 14 Avenue<br>(Caracas Avenue)<br>with Calle 45 Avenue<br>(Francisco Miranda<br>Avenue). | 3,500      |
| Section 6   | km 19+900 | km 23+900  | Carrera 14 Avenue<br>(Caracas Avenue)<br>with Calle 45 Avenue<br>(Francisco Miranda<br>Avenue).                   | Carrera 20 Avenue<br>(Paseo de los<br>Libertadores<br>Avenue) with Calle<br>80.                 | 4,020      |

#### Table 2– General information by sections



From Figure 1 to Figure 6 the sections for the transfer of the PLMB networks are observed, in Annex L1T1-CON-AMB-PN-0013\_A01 the plans of each one of the sections with vertices are presented and in Annex L1T1-CON-AMB-PN- 0013\_A02, the coordinates are displayed.



Figure 1 Location Section 1 of the Plan for transfer, protection, relocation and/or network management



Source: Metro Bogotá L1 Environmental Consortium, 2021

Figure 2 Location Section 2 of the Plan for transfer, protection, relocation and/or network management





Figure 3 Location Section 3 of the Plan for transfer, protection, relocation and/or network management

Source: Metro Bogotá L1 Environmental Consortium, 2021



Figure 4 Location Section 4 of the Plan for transfer, protection, relocation and/or network management.





Figure 5 Location Section 5 of the Plan for transfer, protection, relocation and/or network management





Figure 6 Location Section 6 of the Plan for transfer, protection, relocation and/or network management

The execution schedule for the activities of the PLMB Plan for transfer, protection, relocation and/or network management is 31 months; however, if there are variations in this schedule, the PMAS will remain operational in accordance with said variations. This can be divided into two (2) main stages:

- Transfer, Protection, Relocation and/or Network Management activities in the phase prior to the construction of the viaduct: September 26, 2022 to January 7, 2023.
- Transfer, Protection, Relocation and/or Network Management activities in the viaduct construction phase: January 8, 2023 to April 17, 2025.

This PMAS applies to the 296 works of the transfer, protection, relocation and/or network management plan that interfere with the works of the First Line of the Bogotá Metro – PLMB; in the corridor comprised between: Canal Tintal II at the height of Calle 43 south with Carrera 97C and Carrera 20 Avenue (Paseo de los Libertadores Avenue) with Calle 80; in the previous phase, which are distributed as follows by type of network (aqueduct, sewage, energy, telecommunications and gas). It is necessary to clarify that, from now on, reference will be made to wet networks to refer to aqueduct and sewage networks; and dry networks to refer to power and telecommunications lines.

The different types of networks can be intervened in four (4) ways, which are the following:

- Transfer: It refers to the installation of a new network or section, to which the functionality of the network that will be disabled and/or withdrawn is transferred.
- Protection: It is the installation of one or more elements on a section of the network at a given point, in order to maintain the integrity of the network during the construction of new elements near it.
- Relocation: Corresponds to the removal and installation of a section of the network in another place so that its functionality can be maintained without affecting the provision of the service.
- Management: It is the intervention of an existing network that will be remodeled or modified without changing its initial location.

It should be noted that the activities related to the PMAS for the transfer, protection, relocation and/or network management plan will begin in advance of the viaduct activities, which is why the procedures and/or permits associated with the component Forestry will be requested initially and only for forestry individuals who could be affected by the activity of the transfer, protection, relocation and/or network management plan and, subsequent effects in relation to the construction of the viaduct, will require the corresponding permits.

The PMAS applies to each entity that carries out activities of the transfer plan, protection, relocation and/or management of service networks on behalf of Metro Line 1, including Metro Line 1, its Contractors, Subcontractors, Suppliers and third parties.



## 3.2 METHODOLOGY

The methodology for the preparation of the PMAS was developed taking into account the general guidelines established in the Technical Appendix - AT 15, however, the structure of the document follows the order established in preliminary documents such as the PMAS for the early activities of the Patio Taller and the PMAS for the Construction of the Road Interchange of Calle 72. In this way, the present PMAS is established, accepting the technical criteria necessary for the project and the Safeguard Policies of the Multilateral Bank, in order to guarantee the environmental sustainability of the project, as well as prevent, mitigate and manage environmental and social risks and impacts, enhance positive impacts and improve the process of participation of the various actors in decision-making. Watch for Methodology in Annex L1T1-CON-AMB-PN-0013\_A03.

| Banco<br>Interamericano de<br>Desarrollo (BID)  | Banco Mundial<br>(BM)   | Banco Europeo de<br>Inversiones (BEI)  |
|---|---|--|
| <ol> <li>Política de medio<br/>ambiente y cumplimiento<br/>de salvaguardas (OP -<br/>703)</li> <li>Política de gestión de<br/>riesgo de desastres<br/>naturales (OP-704).</li> <li>Política operativa sobre<br/>reasentamiento<br/>involuntario (OP-710).</li> <li>Igualdad de género en el<br/>desarrollo (OP-761).</li> <li>Política de acceso a<br/>información (OP-102).</li> </ol> | <ol> <li><u>Evaluación ambiental</u><br/>(<u>OP 4.01).</u></li> <li><u>Manejo de pesticidas</u><br/>(<u>OP 4.09)</u></li> <li><u>Recursos físicos y</u><br/><u>culturales (OP 4.11)</u></li> <li><u>Reasentamientos</u><br/><u>involuntarios (OP 4.12)</u></li> <li><u>Hábitats naturales,</u><br/><u>OP/BP 4.04</u></li> </ol> | <ul> <li>11. Evaluación de impactos<br/>ambientales y sociales y<br/>riesgos.</li> <li>12. Prevención y eliminación de<br/>la contaminación.</li> <li>13. Biodiversidad y ecosistemas.</li> <li>14. Cambio climático.</li> <li>15. Patrimonio cultural.</li> <li>16. Reasentamiento<br/>involuntario.</li> <li>17. Derechos e intereses de<br/>grupos vulnerables.</li> <li>18. Estándares laborales.</li> <li>19. Salud ocupacional y pública.</li> </ul> |

Figure7Multilateral Banking safeguards activated for the PLMB project

The application of each Policy will be addressed in each of the chapters of this study. Here are the following details:

The resettlement of the social units affected by the property acquisition for the construction of the PLMB will be done in accordance with Resolution 190 of 2021 "By means of which the General Resettlement Plan for the First Line of the Bogotá Metro is adopted, as Resettlement and Social Management Policy for the PLMB project" and that has No Objection from the Multilateral Bank. If property acquisition is required within the framework of this PMAS, the respective Resettlement Plan must be applied. Also, this policy applies in the context of loss of assets or access to assets and loss of sources of income or means of subsistence, whether or not those affected must relocate elsewhere.



In relation to the Natural Habitats Policy, which aims to support the protection, maintenance and rehabilitation of natural habitats and their functions, applying a preventive approach with respect to the management of natural resources, in order to guarantee opportunities for sustainable development. from the environmental point of view. Thus, within the framework of this study, the application of the policy was evaluated, however, within the study area no vulnerable natural habitats were identified that maintain their ecological functions, this taking into account that the project is developed in highly intervened areas and of anthropic intervention.

Likewise, the technical references established in the General Guidelines on the environment, health and safety of the (Corporación Financiera Internacional - IFC y Grupo del Banco Mundial). This is how the general principles on the environment, health and safety were complemented through the guidelines for Air Emissions and Air Quality, Energy Conservation, Wastewater and Water Quality, Hazardous Materials Management, Waste Management, Noise, Contaminated soils, Occupational hygiene and safety, Community hygiene and safety, and Construction and dismantling.

The execution of the process started from the identification of the areas to be intervened, the activities to be carried out and the definition of the construction processes by the Design and Construction Departments of the ML1 Concessionaire. This in joint work with environmental consulting.

Subsequently, the definition of preliminary areas of influence was carried out, from which the abiotic, biotic and socioeconomic environments were characterized; at the same time that the demand, use, exploitation and/or affectation of natural resources by the project was defined and identified.

Subsequently, the definition of preliminary areas of influence was carried out, from which the abiotic, biotic and socioeconomic environments were characterized; at the same time that the demand, use, exploitation and/or affectation of natural resources by the project was defined and identified.

The permits processed to date by the ML1 Concessionaire are listed below:

- Urban Fauna Management Plan: This document is approved by the SDA through File 2022EE168423 of July 7, 2022.
- Construction and Demolition Waste Management Plan (PG RCD): This document is approved by the SDA through file 2022EE75545 dated April 5, 2022.
- According to Official Letter-2022152000026931 of March 28, 2022 of the Institute of Anthropology and History-ICANH, the Concessionaire is not required to present a preventive archeology program. However, in the event of a fortuitous finding of archaeological assets during the development of the project, the Concessionaire must apply the protocol for managing accidental finds of archaeological heritage. In this same sense, it will complement these protocols to the guidelines of the Ministry of Culture, the Bogotá Metro company-EMB and the Safeguards of the Inter-American Development Bank-IDB, the World Bank-BM and the European Investment Bank-EIB.

Next, the environmental permits or procedures required before the execution of this PMAS and that must be managed by the ML1 Concessionaire, in order to obtain a timely response from the authority and comply with the work schedule.

- Canal Occupation Permit POC for the Albina Canal and Application Procedure for Intervention Guidelines in the Environmental Management and Preservation Zone - ZMPA in the Rio Seco Canal: Filing date is established on January 26, 2023 for the Albina Canal and on August 31, 2022 for the Río Seco Canal. This is because the probable start date for construction activities is estimated to be November 2 and June 26, 2023, respectively.
- Forest exploitation permit includes management of vascular and non-vascular epiphytic flora: It will be processed in accordance with the work schedule

The abiotic and socioeconomic characterization was carried out from secondary information of origins or significant sources such as the ESIA carried out for the structuring stage of the PLMB (Consorcio METRO BOG, SISTRA, INGETEC y FDN, 2019) and, based on primary information from the studies developed by the Metro Bogotá L1 Environmental Consortium, in the year 2021, within the ESIA Update; which correspond to monitoring: environmental noise, air, water quality and the biotic characterization of: fauna, epiphytic and forest flora.

| monitored<br>resource | monitoring points  | monitoring<br>date                      | Monitored parameters  |
|-----------------------|--|---|---|
| Superficial<br>water  | 7 bodies of water: Canal<br>Albina, Canal Arzobispo,<br>Canal Río Fucha, Canal<br>Río Seco, Canal<br>Cundinamarca, Río<br>Bogotá, Canal Tintal II,<br>which are found along the<br>route | On November<br>4,5,8 and 9,<br>2021     | Temperature, electrical conductivity, dissolved<br>solids, sedimentable solids, total suspended<br>solids, turbidity, hydrocarbons, pH, flow rates,<br>dissolved oxygen, chemical oxygen demand,<br>biochemical oxygen demand, total nitrogen, total<br>phosphorus, surfactants, oils, fats and metals. In<br>addition, the Langelier index, Buffer capacity and<br>water quality index were calculated.  |
| Underground<br>water  | 14 punctual samples of<br>piezometers  | On October 7<br>and December<br>9, 2021 | pH: potential of hydrogen; temperature; ECw:<br>electrical conductivity; DO: dissolved oxygen;<br>TDS: total dissolved solids; TSS: total<br>suspended solids; BOD5: 5-day biological<br>oxygen demand; COD: chemical oxygen<br>demand; HCO3-: bicarbonates; CO32-:<br>carbonates; CI-: chloride; SO42-: sulfate; N-<br>NO3: Nitrates; P-PO43-; phosphates; Na+:<br>sodium; K+: potassium; Ca2+: calcium; Mg2+:<br>magnesium; Fe: total iron; Mn: total manganese;<br>Col.F: fecal coliforms; Col.T: total coliforms;<br>E.Coli: Escherichia coli; HC: Hydrocarbons |
| Air                   | 30 monitoring points<br>located throughout the area<br>of influence  | From<br>September 15                    | Particulate Matter PM10, Particulate Matter<br>PM2.5, Nitrogen Dioxide NO2, Sulfur Dioxide<br>SO2, Carbon Monoxide CO, Total Hydrocarbons   |

#### Table 3– Summary of monitoring applicable to the environmental baseline



| monitored<br>resource | monitoring points                          | monitoring<br>date                    | Monitored parameters   |
|-----------------------|--|---------------------------------------|--|
|                       |  | to October 03,<br>2021                | HCT's, Volatile Organic Compounds VOC'S and Ozone O3.  |
| Noise                 | 29 points throughout the area of influence | From July 10<br>to August 02,<br>2021 | Assessment of environmental noise levels,<br>during day and night hours, on business days<br>and non-business days |

Source: Metro Bogotá L1 Environmental Consortium, 2021

Based on this, and the identification of other projects that overlap with the area of influence, the evaluation of environmental and social impacts and risks was carried out.

For the development of the environmental evaluation, Policy OP 4.01 - Environmental evaluation of the (Banco Mundial, BM, 1999), the Policy Evaluation and management of environmental and social impacts and risks of the (Banco Europeo de Inversiones - BEI, 2013), what is described in the document on Standardization and Hierarchy of Environmental Impacts of Projects Licensed by the (ANLA, 2021); and as a methodological basis, the Methodological Guide for the evaluation of the environmental impact of (Conesa Fernández, 2010). The evaluations were carried out identifying the direct, indirect and induced and cumulative impacts, in the context of the project's area of influence.

The result of this evaluation makes it possible to define the definitive areas of influence of the study and review the chapters already prepared. The areas were defined taking into account the cartographic overlap that was generated in the abiotic, biotic and socioeconomic environments of the direct and indirect areas, where the manifestation of significant environmental impacts is expected.

Once these activities were carried out, the respective environmental and social management programs and the structuring of the follow-up and monitoring plan were developed, also taking into account the occupational health and safety management plan and the risk management plan. disaster; all based on the applicable and current regulatory references, as well as the safeguard policies and standards of the Multilateral Banking related to the project.

In general, and from the preparation of this PMAS, a series of reviews have been carried out with entities such as the Multilateral Banking, the comptroller, the EMB and participation scenarios have been carried out with different actors that have allowed feedback and polishing of everything. the content presented here. The versions prepared are described below, with the entities that carried out revisions to the versions, as well as the moments of integration of the various topics with Multilateral Banking:

- Version VA0: May 6, 2022. Before this version, comments were issued on previous chapters by the Auditor and the ML1 Concessionaire.
- Presentation to the Multilateral Bank of the general methodology for preparing the PMAS and technical description of the project: May 11, 2022. Recommendations were received regarding methodological aspects.
- Presentation to the Multilateral Bank of the Social Methodology for the elaboration of the PMAS: May 11, 2022. Recommendations were received regarding the methodological aspects for the

elaboration of the social environment of the study.

- VBB version: May 23, 2022. The Audit Office reviewed and issued comments on the various chapters of this version, which was addressed and filed as CC version.
- Presentation to the Multilateral Bank of the characterization and other social items of the PMAS: May 26, 2022. The Bank expressed its agreement with the process carried out and exposed.
- Presentation before the Multilateral Bank of review of forest species to be compensated: May 26, 2022. The list of forest species approved by the Multilateral Bank was expanded, including the 69 species approved jointly with the environmental authorities, auditing and the Bank.
- Presentation to the Multilateral Bank of the abiotic and biotic media, in parts of the study such as Characterization, zoning, areas of influence, demand for resources and evaluation of impacts of the PMAS: May 27, 2022. The Bank expressed its agreement with the process carried out and exposed.
- VCC version: June 23, 2022. Observations of the Comptroller issued by File L1T1-INT-CE-22-1651 of June 3, 2022 and File L1T1-INT-CE-22-1709 of June 7, 2022 are addressed.
- VDD version: July 11, 2022. Audit observations issued by Audit File L1T1-INT-CE-22-1944 dated June 29, 2022 and EMB File EXTS22-0003789 dated July 11, 2022 are addressed.
- VEE version: Environmental observations from the World Bank Colombia and IDB of August 4, 2022 are addressed. EMB observations received on August 11, 2022 are addressed.
   Observations from the EIB received on August 12 are addressed and additional observations from the World Bank received on August 12, 2022 are addressed.

Likewise, the information obtained through the different participation scenarios allowed confirming and specifying aspects of the diagnosis and the consequent identification, analysis and evaluation of the impacts that are explained later in this document.

- Meetings with 40 entities from the health and education sectors, who were presented with the general aspects of the project and a dialogue was established around the possible impacts that electromagnetic interference can generate on electrical equipment, issues such as income to the institutions, the management of ambulances and emergency care vehicles, and the impacts generated on the users of the services by the construction in terms of noise and pollution (environmental impacts). The education sector meetings were held on the following dates: a) 11/22/2021; b) 05/23/2022 and c) 06/06/2022 and those of the health sector on the following dates: a) 11/12/21; b) 06/06/22 and c) 10/28/21.
- Mapping of social actors, through which 327 social organizations have been identified and visited, which were registered in the instrument designed for this purpose that takes up the mapping model of the World Bank (see Annex L1T1-CON-AMB-PN-0013\_A17 / 17\_14 Mapping of social actors and interest groups). This mapping has been in the works since 2021.
- 3 meetings in section 4 (Santa Isabel neighborhood, town of Antonio Nariño), in response to the requests and concerns of the community, regarding the studies and designs in progress, the planned works and the impacts generated by the purchase of land. These moments allowed to know the expectations of the citizens, the traditional participation mechanisms and the leaders.



on the following dates: a) 09/04/20221; b) 09/09/2021; c) 11/22/2021 and d) 10/28/21.

Visits made to merchants in the framework of the development of the ESIA, information that is considered pertinent given that the same route is shared for the PMAS, carried out from June 11 to July 6, 2022.



# 4 DEFINITIONS AND ABBREVIATIONS

It describes the definitions necessary for understanding the document, as well as the abbreviations used.

The following are the abbreviations to be taken into account in this summary and in the PMAS:

- AAC: Competent Environmental Authority
- AEIA: Area of Special Environmental Interest
- AID: Area of Direct Influence
- All: Area of Indirect Influence
- ANDI: National Association of Entrepreneurs of Colombia
- ANLA: National Authority for Environmental Licenses
- Avenue: Avenue
- Ac: Avenue Street
- Ak: Carrera Avenue
- BDH: Central Mortgage Bank
- EIB: European Investment Bank
- BIC: Assets of Cultural Interest
- ▶ IDB: Inter-American Development Bank
- ▶ WB: World Bank
- CAL: Local Environmental Commission
- CAMACOL: Colombian Chamber of Construction
- CAR: Regional Autonomous Corporation
- CCB: Bogota Chamber of Commerce
- CCLPE: Local Consecutive Council for Educational Policy.
- CCNNA: Consecutive Council of Boys, Girls and Adolescents
- CDC: Community Development Center
- CDI: Child Development Centers
- CDSS: District Council and Local Wise Men and Women
- ECLAC: Economic Commission for Latin America and the Caribbean
- ► ISIC: International Standard Industrial Classification
- CINTEL: Center for Research and Development in Information and Communication Technologies
- ► CIT: Territorial Integration Committees
- CLPH: Local Council of Horizontal Property
- ► CLB: Local Bicycle Council
- CLM: Local Mobility Commission
- CLGR: Local Council
- CLACP: Local Council of Art Culture and Heritage
- CLD: Local Disability Council
- CLOPS: Local Council for Social Policy



- CLSS: Local Council of Wise Men and Women
- CLSM: Local Security Council for women
- CLPYBA: Local Council for Animal Protection and Welfare
- COLEV: Good Treatment Network Local Operating Committee on Aging and Old Age
- COLE: Local Operative Committee of Ethnic Groups
- COLFA: Local Family Operating Committee
- COLJ: Local Youth Operative Committee
- COLMYEG: Local Operational Committee for Women and Gender Equity
- ► CORPOPATRIMONIO: Civic Corporation of Owners for the Defense of Assets of Cultural Interest
- COVID-19: SARS-CoV-2 virus
- CPL: Local Planning Council
- CRAC: Rehabilitation Centers for Blind Adults
- CREA: Training and Artistic Creation Centers
- DANE: National Administrative Department of Statistics
- DIMF: Child Development in a Family Environment
- DRAFE: Local Council for Sport, Recreation, Physical Activity, Parks, Scenarios and Recreational and Sports Facilities
- EAAB: Aqueduct, Sewage and Cleaning Company of Bogotá
- EEP: Main Ecological Structure
- ESIA: Environmental and Social Impact Study
- EPS: Health Provider Entities
- EMB: Bogotá Metro Company
- ► EMB\_2017: Multipurpose Survey 2017
- ESMAD: Mobile Anti-riot Squad
- ETB: Bogota Telecommunications Company
- FONDETUR: Bogotá Tourism Development Fund
- LEAK: Gilberto Álzate Avendaño Foundation
- ► HIMAT: Colombian Institute of Hydrology, Meteorology and Land Adaptation
- ISO:International Organization for Standardization
- ICA: Water Quality Index
- ► ICANH: Colombian Institute of Anthropology and History
- ▶ IDARTES: District Institute of the Arts
- ▶ IDEAM: Institute of Hydrology, Meteorology and Environmental Studies
- ▶ IDIGER: District Institute for Risk Management and Climate Change
- IDPC: District Institute of Cultural Heritage
- ► IDU: Institute of Urban Development
- ► IE: Education Institutions
- ► IED: District Educational Institution
- IPES: Institute for the Social Economy
- ► IPS: Institutions Providers of Health Services



- ▶ IDRD. District Institute of Recreation and Sports
- ► ICBF: Colombian Institute of Family Welfare
- ► IDEPAC: District Institute for Community Participation and Action
- ► IDT: District Tourism Institute
- INEM: National Institutes of Secondary Education
- IRCA: Water Quality Risk Index
- ► JAL: Local Action Board
- JAC: Community Action Board
- ▶ JBB: Bogota Botanical Garden
- Km: Kilometer
- LGBTI: Population: Lesbian, Gay, Bisexual, Transgender and Intersex
- MADS: Ministry of Environment and Sustainable Development
- MAVDT: Ministry of Environment, Housing and Territorial Development
- MISE: Business Service Models
- ML1: Metro Line 1 SAS
- NPH: It is not a horizontal property
- NTC: Colombian Technical Standards
- OFB: Bogota Philharmonic Orchestra
- OHSAS: Occupational Health and Safety Assessment Series
- ► ILO: International Labor Organization
- ▶ NGO: Non-Governmental Organization
- ► GDP: Gross Domestic Product
- ► PEA: Economically Active Population
- PET: Population of Working Age
- ▶ PEDH: Wetland District Ecological Park
- PH: Horizontal Property
- PLMB: First Line of the Bogotá Metro
- > PMAS: Environmental and Social Management Plan
- UNDP: United Nations Development Program
- POMCA: Hydrographic Basin Planning and Management Plan
- PONAL: National Police
- ▶ POT: Territorial Ordering Plan
- > PPPS: Whereabouts, book stands and park stands
- PQRS: Request, complaints, claims or suggestions
- PST's: Tourist Service Providers
- RCD: Construction and Demolition Waste
- ▶ RIAPI: Comprehensive Route Table for Early Childhood Care
- RMCAB: Bogotá Air Quality Monitoring Network.
- SAN: Committee on Food and Nutritional Security
- SDA: District Secretary of the Environment



- SDDE: District Secretariat for Economic Development
- SDIS: District Secretariat for Social Integration
- SDP: District Planning Secretariat
- SED: Secretary of Education of the District
- SENA: National Apprenticeship Service
- SIA: Environmental Information System of the Capital District.
- SIAC: Colombian Environmental Information System
- SIC: Sites of Cultural Interest
- AIDS: Acquired immunodeficiency syndrome
- SLIS: Local Subdirectorate for Social Integration
- SIM: Comprehensive Services for Mobility
- SPD: Home Public Service
- SMMLV: Current Legal Monthly Minimum Wage
- SIMAT: Student Enrollment System
- SIMUR: Integrated Information System on Regional Urban Mobility
- SISBEN: Identification System for Potential Beneficiaries of Social Programs
- SITP: Integrated Public Transportation System
- SGSSS: General System of Social Security in Health
- SIGAU: Information System for the Management of Urban Trees
- SIB: Colombian Biodiversity Information System
- SIRE: information system for risk management and climate change
- SVCA: Air Quality Surveillance System
- TD: Unemployment Rate
- ► TGP: Global Participation Rate
- ► IT: Information Technology
- ► ICT: Information and Communication Technologies
- TO: Occupation Rate
- UAESP: Special Administrative Unit for Public Services
- UNAD: National Open and Distance University
- UNCRD: United Nations Center for Regional Development
- UPA: Primary Care Unit
- UPZ: Zonal Planning Units
- URI: Immediate Reaction Unit
- VIS: Housing of Social Interest



# 5 **RESPONSIBLE**

The Metro Line 1 Concessionaire has an organizational structure that allows it to ensure compliance and implementation of the Environmental, Social, Health and Safety Management activities required for the development of the Project, complying with the Environment and Compliance Policy. of safeguards – OP.703), in reference to having professionals with adequate experience in the development of this type of study.

In a First Level, it has the personnel hired directly by the Concessionaire, who leads the studies, management and processing of permits and licenses, leads the implementation of the Systems and represents the Project before the Bogotá Metro Company and Auditing.







At a second level is the Contractor's staff, which is responsible for the on-site implementation, environmental, social and occupational health and safety management and is also governed by the Contractors' Manual established in Annex 4, as a contractor tracking tool.



Figure 9 Organization Chart Environmental, Social and SST Team –

Contractor

Source: Metro Line 1, 2021



For the preparation of this PMAS, the Metro Line 1 Concessionaire had the support of the Metro Bogotá L1 Environmental Consortium, which is made up of the following organizational structure.



Figure 10 Organization Chart Environmental Consortium Metro

Bogotá L1



# 6 **REFERENCES**

The technical document lists contractual, regulatory and documentary references related to the updating of the Environmental Management Plan for the plan for the transfer, protection, relocation and/or network management of the PLMB, the applicable references are specified in greater detail in Volume 1, numeral 6 of the Environmental and Social Management Plan for the transfer, protection, relocation and/or network management of the PLMB, below is a brief description of the references:

## 6.1 CONTRACTUAL

Correspond to Contract No. 163 of 2019 PMLB between Empresa Metro de Bogotá SA and Concessionaire Metro Línea 1 SAS, the respective Technical Appendices, mainly Technical Appendix No 14 - Social Management and Technical Appendix No 15 - Environmental Management and Health and Safety in the Work and its Annex 1; the "Manual for Monitoring and Environmental Control and Safety and Health at Work -SST" and the Environmental and Social Impact Study prepared by the (Consorcio METRO BOG, SISTRA, INGETEC y FDN, 2019)

## 6.2 REGULATIONS

In the description of the regulatory framework, it is indicated for the components of: Safety and Health at Work - SST; Social and Environmental the applicable National norms and the policies and standards of the International Banks.

## 6.2.1 Applicable National Regulations – Environmental

For the environmental component, abiotic and biotic media; in Annex L1T1-CON-AMB-PN-0013\_A04, the regulations to be considered are presented.

## 6.2.2 Applicable National Regulations – Occupational Health and Safety

The regulations applicable to Health and Safety at Work can be found in Annex L1T1-CON-AMB-PN-0013\_A04.

#### 6.2.3 Applicable National Regulations – Social

For the social component, the regulations to be considered within the PMAS for the Plan of transfer, protection, relocation and/or network management of the PLMB, is the one indicated in numeral 6.2.2 Applicable

# 6.2.4 Permits and Licenses required for the activities of the transfer, protection, relocation or network management plan

For the activities of the transfer plan, protection, relocation and/or network management of the PLMB project, the processing of permits and licenses is required, which were identified in Volume 1, which correspond to those related to the forestry component and riverbed occupation permit, forest use.



## 6.2.5 Activated Safeguard Policies of the World Bank – WB for the Project

During the execution of the transfer of the networks along the corridor of the First Line of the Bogotá Metro - PLMB, the ML1 Concessionaire guarantees compliance with the World Bank safeguards, through the Environmental Management Programs.

The resettlement of the social units affected by the property acquisition for the construction of the PLMB will be done in accordance with Resolution 190 of 2021 "By means of which the General Resettlement Plan for the First Line of the Bogotá Metro is adopted, as Resettlement and Social Management Policy for the PLMB project" and that has No Objection from the Multilateral Bank. If property acquisition is required within the framework of this PMAS, the respective Resettlement Plan must be applied . Also, this policy applies in the context of loss of assets or access to assets and loss of sources of income or means of subsistence, whether or not those affected must relocate elsewhere.

## 6.2.6 Safeguard Policy of the Inter-American Development Bank – IDB for the Project

Through the environmental management programs, the ML1 Concessionaire will guarantee compliance with the Safeguards Policy activated by the Inter-American Development Bank – IDB. Complying with the objectives of each applicable safeguard, as well as each program through which compliance will be guaranteed.

## 6.2.7 Activated standards of the European Investment Bank – EIB for the Project

The standards activated by the European Investment Bank - EIB, will be met during the execution of the activities of the transfer, protection, relocation and/or network management plan; through the environmental management programs as indicated in Annex L1T1-CON-AMB-PN-0013\_A04.

#### 6.3 DOCUMENTARIES

The Documentary References for the preparation of the document are specified in numeral 6.3 Documentaries of the Environmental and Social Management Plan for the transfer, protection, relocation and/or network management of the PLMB Volume 1



# 7 BIOTIC AND ABIOTIC ENVIRONMENTAL DEVELOPMENT

## 7.1 DESCRIPTION AND LOCATION OF THE WORKS

# 7.1.1 Location of the execution area of the transfer, protection, relocation and/or network management plan

The transfer works of hydro-sanitary networks, dry networks and gas networks will be carried out along the projected direct area of influence for the construction of the First Line of the Bogotá Metro - PLMB, starting the intervention from Av. Villavicencio with Carrera 97C in the south of the city and ending on Av. Los Libertadores with Calle 80, to the north. The objective of these works is to carry out the intervention of the existing networks that interfere with the construction of the viaduct and the PLMB stations. The work of moving, protecting, relocating and/or managing networks that can replace, improve and/or maintain the operation of existing networks, includes, in some cases, the disabling of existing networks without removing them.

The area to intervene will be divided into six (6) sections (as shown in Figure 12) where 295 transfer activities will be carried out for the components of hydro-sanitary, dry and gas networks.

The area of direct influence where these transfer works will be carried out is the environmental jurisdiction of the District Environment Secretariat.

In Figure 11, the location and the area of direct influence of the project are presented.



Figure 11 Location and area of direct influence of the PLMB



#### In Table 4 the length and location of the sections for the transfer of networks is presented:

| Section      | Length | Area   | Abscissa     |           | pathways   |   |  |  |
|--------------|--------|--------|--------------|-----------|--|---|--|--|
|              | (Km)   | (Ha)   | Since        | Until     | Since  | Until   |  |  |
| Section<br>1 | 2.03   | 9.27   | km 1+700     | km 3+750  | Canal Tintal II at the<br>height of Calle 43 sur<br>with Carrera 97 C.                                       | Calle 43 south with<br>Avenida Carrera 86<br>(Av. Ciudad Cali).   |  |  |
| Section<br>2 | 4.04   | 25.65  | km 3+750     | km 7+800  | Calle 43 south with<br>Avenida Carrera 86<br>(Av. Ciudad Cali).  | Avenida Calle 26 Sur<br>(Avenida Primero de<br>Mayo) with Carrera 72<br>M BIS.                            |  |  |
| Section<br>3 | 4.08   | 33.26  | km 7+800     | km 11+850 | Avenida Calle 26 Sur<br>(Avenida Primero de<br>Mayo) with Carrera<br>72 M BIS.                               | Avenida Calle 26 Sur<br>(Avenida Primero de<br>Mayo) with Transversal<br>31 (Avenida Ciudad de<br>Quito). |  |  |
| Section<br>4 | 4.18   | 30.31  | km 11+850    | Km 16+050 | Avenida Calle 26 Sur<br>(Avenida Primero de<br>Mayo) with<br>Transversal 31<br>(Avenida Ciudad de<br>Quito). | Carrera 14 Avenue<br>(Caracas Avenue) with<br>Calle 10.   |  |  |
| Section<br>5 | 3.86   | 24.78  | Km<br>16+050 | Km 19+900 | Carrera 14 Avenue<br>(Caracas Avenue)<br>with Calle 10.  | Carrera 14 Avenue<br>(Caracas Avenue) with<br>Calle 45 Avenue.  |  |  |
| Section<br>6 | 3.93   | 26.92  | Km<br>19+900 | Km 23+900 | Carrera 14 Avenue<br>(Caracas Avenue)<br>with Calle 45 Avenue.   | Carrera 20 Avenue<br>(Paseo de los<br>Libertadores Avenue)<br>with Calle 80.                              |  |  |
| Total        | 22.12  | 150.19 |              |           |  |   |  |  |

#### Table 4– Characteristics of sections for the transfer of networks

Source: Metro Line 1

In Figure 12 The location of the six (6) sections into which the transfer, protection, relocation and/or network management project has been divided along the PLMB corridor is presented. In Annex L1T1-CON-AMB-PN-0013\_A01 / 1\_2 Plans you will find the general location plans of the sections:



#### EXECUTIVE SUMMARY - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE TRANSFER, PROTECTION, RELOCATION AND/OR NETWORK MANAGEMENT OF THE PLMB



Figure 12 Location of the Sections for the transfer of nets

Source: Metro Bogotá L1 Environmental Consortium, 2022

It should be noted that the network transfer works will be carried out on roads or public spaces, therefore, no purchase of land is planned. Annex L1T1-CON-AMB-PN-0013\_A05 / 5\_1 Sinks includes information on the sinks that are located throughout the area of direct influence of the PLMB.

## 7.1.2 Interference description

They identified a total of 296 interference between aqueduct, sewage, energy, telecommunications and natural gas networks, which will have to be relocated prior to the start of the construction works of the First Line of the Bogotá Metro (PLMB). In Figure 13 A general plan of the areas where there are different interferences along the PLMB corridor is observed:



#### EXECUTIVE SUMMARY - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE TRANSFER, PROTECTION, RELOCATION AND/OR NETWORK MANAGEMENT OF THE PLMB



Figure 13 General location of interference

Source: Prepared by the Bogotá L1 Metro Environmental Consortium, with information from WSP, 2022.

In Table 5 the different interferences are specified by section and by type of network:

| Table 5 – Interference identification |  |
|---------------------------------------|--|
|---------------------------------------|--|

| Section | Aqueduct          | Sewerage |         |          | Energy  | telecommunications |          |      | <b>C a a</b> | TOTAL   |
|---------|-------------------|----------|---------|----------|---------|--------------------|----------|------|--------------|---------|
|         |                   | Sanitary | Pluvial | combined | Energy  | ETB                | Movistar | Tigo | Gas          | SECTION |
| 1       | two               | 1        | -       | -        | 3       | 1                  | -        | -    | 4            | eleven  |
| two     | 12                | eleven   | 10      | -        | 13      | 1                  | 1        | 1    | 14           | 63      |
| 3       | 4                 | 7        | 6       | -        | 8       | two                | 1        | 1    | 12           | 41      |
| 4       | 17                | 1        | two     | 14       | 14      | 1                  | -        | 1    | 18           | 68      |
| 5       | 12                | -        | -       | 17       | 12      | two                | -        | -    | 5            | 48      |
| 6       | 12                | -        | two     | 16       | fifteen | 13                 | -        | -    | 7            | 65      |
| TOTAL   | 59                | twenty   | twenty  | 47       | 65      | twenty             | two      | 3    | 60           | -       |
|         | 296 INTERFERENCES |          |         |          |         |                    |          |      |              |         |

Source: Metro Bogotá L1 Environmental Consortium, 2022

The companies in charge of providing public services, which are going to be intervened, are: Empresa de Acueducto y Alcantarillado de Bogotá (EAAB); Aqueduct and Sewage Company of Bogotá (EAAB); ENEL – Codensa; Bogota Telecommunications Company (ETB); Telefonica Movistar; UNE Telecommunications (TIGO-UNE) and Grupo VANTI SA



Taking into account that the transfer activities will be carried out for different types of networks, both dry and wet, the construction processes may be similar, however, there are some differences, since for some sections of dry networks, that is, energy and telecommunications, They will carry out remodeling work on networks and boxes, which means that transfer work will not be carried out, but rather that the conditions of the existing infrastructure will be improved in order to increase capacity in accordance with the development not only of the project, but also of the growth of the areas adjacent to the PLMB.

#### 7.1.3 Activities

The activities that will be carried out for the execution of the transfer of the different types of networks for interference. Installation and operation of camps and storage areas for materials and equipment

- Work enclosure
- Area signage
- Implementation of the PMT (Traffic Management Plan)
- Location and layout
- Platform and/or Pavement Demolition (Wells and Inspection Boxes)
- Silvicultural management and removal of vegetation cover
- Manual and/or Mechanical Excavation
- Removal of existing pipes and fittings
- Removal of structures, wiring, ducts, accessories and existing equipment
- Transportation and handling of materials, structures, waste and excavation surpluses
- Construction of pass boxes, wells, covers and installation of posts and hydrants
- Installation of aqueduct, sewage and gas pipes and accessories
- Installation of ducts and wiring for telecommunications and energy
- Temporary suspension of public services
- Protection of existing pipes
- Functionality test
- Conformation of base and sub-base, finishing of platforms and pavements
- Reconformation of green areas
- Removal of enclosure and signage. Construction machinery

In the Table 6 The general list of the machinery that will be used for the development of the network transfer activities is presented.


#### Table 6 – Construction machinery

| Description                               | Quantity |
|---|----------|
| Excavator 13 tons.                        | 6        |
| skid steer loader                         | 6        |
| dump truck                                | 18       |
| 1 ton manual vibro roller compactor       | two      |
| 4" submersible electric motor pump        | 6        |
| kangaroo type compactor                   | 3        |
| 3" suction motor pump                     | two      |
| Gasoline power plants of 3.0 kW or higher | 6        |
| 9" industrial polisher                    | 6        |
| Industrial hammer drills T 70             | 6        |
| Compressor 125 CFM                        | 4        |
| pavement cutter                           | two      |
| Rig                                       | 1        |
| Sludge pump and mixer                     | 1        |
| drill string                              | 1        |
| guidance system                           | 1        |
| Hydrostatic testing equipment             | 1        |

Source: Metro Line 1, 2022

## 7.1.4 Schedule of construction activities

In Figure 14, the execution schedule of the activities of the Plan for transfer, protection, relocation and/or network management of the PLMB services is presented, for each of the sections, which has a duration 31 months, however, if there are variations in this schedule, the PMAS will remain operational in accordance with said variations.

| Actividad   | Fecha inicio<br>Fase Previa | Fecha fin<br>Fase<br>Previa | Fecha inicio<br>Fase<br>Construcción | Fecha fin<br>Fase<br>Construcción | 1-sep-22 | 1-oct-22 | 1-nov-22 | 1-dic-22<br>7.ene-23 | 8-ene-23 | 1.feb.23 | 1-mar-23 | 1-abr-23<br>1-may-23 | 1-jun-23 | 1-jul-23 | 1-sep-23 | 1-oct-23 | 1-nov-23 | 1-dic-23 | 1.feb.24 | 1-mar-24 | 1-301-24 | 1-may-24 | 1-jun-24 | 1-ago-24 | 1-sep-24 | 1-oct-24 | 1-nov-24 | 1-ene-25 | 1.feb.25 | 1-mar-25<br>1-abr-25 |
|---|-----------------------------|-----------------------------|--------------------------------------|-----------------------------------|----------|----------|----------|----------------------|----------|----------|----------|----------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------------------|
| Plan de traslado, protección,<br>reubicación y/o gestión de redes                                       | 15-sep-22                   | 7-ene-23                    | 8-ene-23                             | 17-abr-25                         |          |          |          |                      |          |          |          |                      |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                      |
| Manejo Silvicultural (Plan de traslado,<br>protección, reubicación y/o gestión de<br>redes - Av.68)     | 26-sep-22                   | 15-oct-22                   |                                      |                                   |          |          |          |                      |          |          |          |                      |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                      |
| Actividades preliminares (Plan de<br>traslado, protección, reubicación y/o<br>gestión de redes - Av.68) | 26-sep-22                   | 30-oct-22                   |                                      |                                   |          |          |          |                      |          |          |          |                      |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                      |
| Plan de traslado, protección, reubicación<br>y/o gestión de redes - Av.68                               | 1-oct-22                    | 31-dic-22                   |                                      |                                   |          |          |          |                      |          |          |          |                      |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                      |
| Plan de traslado, protección, reubicación<br>y/o gestión de redes - Tramo 1                             | 25-oct-22                   | 7-ene-23                    | 8-ene-23                             | 18-mar-24                         |          |          |          |                      |          |          |          |                      |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                      |
| Plan de traslado, protección, reubicación<br>y/o gestión de redes - Tramo 2                             | 25-oct-22                   | 7-ene-23                    | 8-ene-23                             | 10-ago-24                         |          |          |          |                      |          |          |          |                      |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                      |
| Plan de traslado, protección, reubicación<br>y/o gestión de redes - Tramo 3                             | 25-oct-22                   | 7-ene-23                    | 8-ene-23                             | 25-may-24                         |          |          |          |                      |          |          |          |                      |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                      |
| Plan de traslado, protección, reubicación<br>y/o gestión de redes - Tramo 4                             | 22-nov-22                   | 7-ene-23                    | 8-ene-23                             | 9-dic-23                          |          |          |          |                      |          |          |          |                      |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                      |
| Plan de traslado, protección, reubicación<br>y/o gestión de redes - Tramo 5                             | 22-nov-22                   | 7-ene-23                    | 8-ene-23                             | 5-sep-23                          |          |          |          |                      |          |          |          |                      |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                      |
| Plan de traslado, protección, reubicación<br>y/o gestión de redes - Tramo 6                             | 22-nov-22                   | 7-ene-23                    | 8-ene-23                             | 17-abr-25                         |          |          |          |                      |          |          |          |                      |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                      |
| Fase Previa   |                             |                             |                                      |                                   |          |          |          |                      |          |          |          |                      |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |                      |

Fase Construcción

Figure 14 Activities execution schedule

Source: Prepared by the Bogotá L1 Metro Environmental Consortium, with information from ML1, 2022.



# 7.2 AREAS OF INFLUENCE

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The delimitation of areas of influence is fundamental in the preparation of environmental studies, because it spatially represents the significance of the environmental impacts caused by project activities, and from this it is possible to determine the scope for the implementation of management measures to prevent, mitigate, correct or compensate for such impacts.

In the Figure 15 the process of defining the areas of influence (direct and indirect) of each environment (abiotic, biotic and socioeconomic) is outlined. It should be clarified that the definition of these areas is based on the superimposition of each of the areas defined for the components, with the largest extension being the most important.





Source: ANLA, 2014, modified by Metro L1 y Consorcio Ambiental Metro Bogotá L1, 2021

The areas of influence for the different components and media were defined taking as a reference point the most critical scenarios of manifestation of the identified environmental impacts, in addition to criteria and variables that mitigate the spatial transcendence of these and that function as barrier or limiting elements, such as changes in land cover, roads, among others. The respective analysis by media and its components is described below.

The Figure 16 represents the overlapping of the areas of influence defined for each of the environments, where the impacts caused by the activities of the PMAS may materialize. and in the Table 7, the total number of hectares that define the IIA for each environment is presented.





Figure 16 Abiotic and Biotic Indirect Influence Area

Source: Consorcio Ambiental Metro Bogotá L1, 2021

| Table 7 – Areas of Indirect Influence for Each Medium |                                 |  |  |  |  |  |  |
|---|---------------------------------|--|--|--|--|--|--|
| Medium  | Area of Indirect Influence (Ha) |  |  |  |  |  |  |
| Abiótico  | 723,44                          |  |  |  |  |  |  |
| Biotic  | 286,77                          |  |  |  |  |  |  |
| Socioeconomic   | 7691,45                         |  |  |  |  |  |  |
|   |                                 |  |  |  |  |  |  |

Source: Consorcio Ambiental Metro Bogotá L 1, 2021

#### 7.3 **CHARACTERIZATION**

#### 7.3.1 Abiotic Medium

The components for characterization are described below:

### 7.3.1.1 Geospheric Component

#### 7.3.1.1.1 Geology

In the area of direct influence are the sediments that make up the units known as the Tunjuelito River Formation (Qrtsa), the Sabana Formation (Qsa2), as well as the deposits of the Chía Formation (Qch1) and deposits of anthropogenic origin of smaller size and relevance. These units represent the upper part of a stratigraphic sequence that overlies formations such as the Bogotá.



### 7.3.1.1.2 Geomorphology

The area of direct influence includes geoforms corresponding to fill planes and fields, flood plains, fluvial settling basins, alluvial fans, lacustrine plains and deltas, torrential flows and a channel (anthropic geoform). For purposes of greater detail and, considering the main orientation of the project, the area of direct influence was divided into two (2) sectors.

Sector 1: is comprised between the project start zone, just after the proposed location of the Patio-Taller area to the intersection of the subway line with Avenida Caracas. The following geoforms were identified within this section:

Alluvial fans (Faa).

TRO LÍNEA

- Flood plains or flood plains (Fpi).
- Flats and fill fields (Ar).
- Fluvial settling basins (Fcd).
- Lacustrine plains and deltas (Fpla).

Sector 2: It is located between the intersection of the subway line and Caracas Avenue up to 80th Street. The following geoforms were identified and are shown in Figure 26 (ANNEX L1T1-CON-AMB-PN-0013\_A01 / 1\_2Plans):

- Planicies y deltas lacustrinos (Fpla):
- Torrential flows (Dlfb):

#### 7.3.1.1.3 Landscaping

Landscape is an important planning tool, through which it is possible to build the territory from the modifications that are made to it and to achieve the welfare of the community through the sense of belonging (Matsuoka & Kaplan, 2008). It is valued mainly based on six (6) elements: contact with nature, aesthetic preference, recreation, social interaction, citizen participation and community identity (Matsuoka & Kaplan, 2008).

In the area of influence of the landscape, the visual quality of the landscape is predominantly low, taking into account that the area of development of the project is an area that is heavily intervened and dominated by anthropic characteristics, which has caused a reduction and transformation of natural spaces that in the long term generated a change in the perception of the landscape, transforming the natural characteristics into an urban condition of high density and occupation, characteristic of the areas in which the development of the project is proposed.

According to the variables evaluated, low values were found: due to the lack of local, zonal or metropolitan parks and the presence of trees and urban gardens; additionally, despite the presence of historical and architectural resources of great importance in the area, it is not very common to find them



throughout the project. On the other hand, green areas and parks were identified in which the inhabitants can interact, which determines that there are areas intended for recreation.

### 7.3.1.1.4 Soils

For the area of direct influence - AID, the regulated land use, according to the provisions of the POT (Decree 555 of 2021), corresponds mostly to urban land, which is equivalent to 94.4% (141.87 Ha) and 5.6% (8.42 Ha) of protected land, with no urban expansion land.

The Structuring Activity Area - Receiving Area for social housing is distributed in 46.5% of the AID; in second place is the Structuring Activity Area - Receiving Area for economic activities with 29%. This is followed by the areas of the Special Management and Protection Plan - National BIC with a representation of 10.3%. Among the categories with the lowest percentage of coverage are the Proximity Activity Area - Generator of urban supports, El Porvenir Metropolitan Park (Gibraltar), Proximity Activity Area - Receiver of urban supports and Large Metropolitan Services Activity Area, with percentage values of 6.6, 1.8, 1% and 1%.

In terms of current land use, road infrastructure predominates in the IDA with 42.3% (63.53 ha), followed by "Residential, Dotacional e Institucional" with 39.3% (58.99 ha) and conservation with 17.6% (26.43 ha). Commercial use is the lowest percentage with only 0.9% (1.33 hectares).

For the Area of Direct Influence, use conflicts are determined as: adequate, representing 83.2% (125.10 ha), underutilized 12.4% (18.69 ha) and overutilized 0.5% (0.78 ha).

### 7.3.1.1.5 Natural Hazards

Once the natural hazards to which the areas of influence of the geospheric component of the project are exposed have been evaluated, the following can be observed:

Threat zoning for mass movement phenomena clearly shows that a large percentage of the area of direct influence is under a null threat categorization. Also, there is a fairly small portion that is located in a low hazard categorization area due to its proximity to the eastern hills. However, it is important to note that at this point the possible effects of this phenomenon are irrelevant and do not represent a relevant risk for the execution of the project.

The flood hazard zoning clearly shows that there are portions of both the IIA and the project's IDA that are within the medium and low hazard categories. The probability of occurrence of a phenomenon of these events ranges between 10% and 65% for the medium threat category and a probability of less than 10% for the low threat zones; however, it is important to highlight that there are mitigation works along the water sources involved (jarillones) and, currently, there are no construction restrictions in these areas.

He areas categorized as no flood hazard have no construction restrictions and, therefore, do not interfere with the execution of the project.



Seismic hazard zoning results for both All and AlD of the project show that most of the evaluated area (>90%) is zoned as medium hazard. The data used for the determination of this parameter were obtained from seismic acceleration values in rock obtained from the Colombian Geological Service database. Despite the fact that the zoning is given as medium, there are no restrictions or effects on the execution of the project within this hazard as long as the design recommendations stipulated in the NRS-10 are taken into account.

### 7.3.1.2 Hydrospheric Component

### 7.3.1.2.1 Hydrology

The 1:25000 scale cartography was used and with the support of satellite images, the lentic and lotic bodies were identified. From what was observed, it can be concluded that there is only one lentic body (Canal Cundinamarca), which operates as a reservoir and flood buffer body; it operates with maximum levels and a pumping system to the Bogotá River.

On the other hand, several streams are identified in the area of influence of the project, including the Canal Río Seco, Canal Albina, Canal Rio Fucha, interceptor quedada Las Lajas, interceptor Comuneros, Canal San Agustín, Canal Arzobispo, Colector Galerías, and river Bogotá, among others..

The Canal Cundinamarca, contrary to what its name indicates, is a body of water used for temporary storage of rainwater. The canal is located on the left bank of the Bogotá River, between 15th Street and 80th Street South. The body of water is approximately 8.43 km long and discharges into the Bogotá River through the Gibraltar pumping station, located on 43rd Street South, that is, at approximately the midpoint of the body of water.

The canals and collectors that discharge into the body of water known as the Canal Cundinamarca son: los Canales Tintal II, III y IV, el Canal Santa Isabel, el Canal Primero de Mayo, el Canal Britarlia, el Canal Calle 38, el Canal América, el Canal Castilla, el Canal Magdalena, el Canal Alsacia, the Granada System Collector, and the Fontibón Central Collector.

From the morphometric analyses of the watersheds, it is observed that most of them are watersheds with steep slopes in the eastern sector, while the slope decreases on the southern and western sides of Bogota. This is reflected in the calculations of time of concentration and lag time, inputs used in the hydrological modeling.

It is observed that the vegetation cover for the hydrographic basins is minimal, an adequate and correct analysis for the condition of urban land. The technical implications of an urban land with little vegetation imply an increase in instantaneous peak flows, taking into account the formation of surface runoff, which was reflected in the calculation of instantaneous peak flows..

From the analyses presented for the calculation of average and minimum flows, it is identified that this methodology depends on adequate information in the inputs, which implies reliable information on precipitation and morphometric characterization. It should be noted that, for the analysis of precipitation studies presented, conventional statistical methods are used for the analysis of homogeneity and



anomalous data. On the other hand, the morphometric calculations of the hydrographic basins are defined with information at a scale of 1:25000, and hydrological soil characterization at an adequate scale. It is concluded that the Pos Campo analyses are adequate and correct for the working scale of the hydrological studies.

# 7.3.1.2.1.1 Significant water sources in the PMAS area

Seven (7) bodies of water were identified in the IIA of the EMP for the relocation of networks, such as the Bogotá River (close to the area of intervention for the project activities). It should be noted that the IDA intercepts six (6) uncovered channels. Next, in the Table 8 The water sources identified and their location are listed:

| Point                      | Name  | Location in the area of influence  |  |  |  |  |  |  |
|----------------------------|---|--|--|--|--|--|--|--|
| 1                          | River Bogotá  | Middle basin of the Bogota River, north side, parallel to the El   |  |  |  |  |  |  |
|                            | -   | Corzo property. Not intercepted by the AID.  |  |  |  |  |  |  |
| 2                          | Canal Cundinamarca  | Carrera 100 between Calle 54S and Av. Villavicencio (Calle 43S).   |  |  |  |  |  |  |
|                            |   | Not intercepted by the AID.  |  |  |  |  |  |  |
| 3                          | Canal Tintal II   | Avenida Villavicencio (AC 43sur) from Carrera 100 to Avenida   |  |  |  |  |  |  |
|                            |   | Ciudad de Cali (AK 86). Intercepted by AID.  |  |  |  |  |  |  |
| 4                          | Canal Rio Seco  | Avenida Primera de Mayo with Carrera 51. Intercepted by AID.   |  |  |  |  |  |  |
| 5                          | Canal Albina  | Avenida Primera de Mayo with Carrera 39. Intercepted by the  |  |  |  |  |  |  |
|                            |   | AID.   |  |  |  |  |  |  |
| 6                          | Canal Rio Fucha   | Diagonal 16 South with Avenida Ciudad de Quito (NQS).  |  |  |  |  |  |  |
|                            |   | Intercepted by the DAI.  |  |  |  |  |  |  |
| 7                          | Canal Arzobispo   | Caracas Avenue with Dg 40A bis. Intercepted by AID.  |  |  |  |  |  |  |
| 2<br>3<br>4<br>5<br>6<br>7 | Canal Cundinamarca<br>Canal Tintal II<br>Canal Rio Seco<br>Canal Albina<br>Canal Rio Fucha<br>Canal Arzobispo | Carrera 100 between Calle 54S and Av. Villavicencio (Calle 43<br>Not intercepted by the AID.<br>Avenida Villavicencio (AC 43sur) from Carrera 100 to Aven<br>Ciudad de Cali (AK 86). Intercepted by AID.<br>Avenida Primera de Mayo with Carrera 51. Intercepted by AID<br>Avenida Primera de Mayo with Carrera 39. Intercepted by T<br>AID.<br>Diagonal 16 South with Avenida Ciudad de Quito (NQ<br>Intercepted by the DAI.<br>Caracas Avenue with Dg 40A bis. Intercepted by AID. |  |  |  |  |  |  |

#### Table 8 – Water Sources Identified in the IIA

Source: Consorcio Ambiental Metro Bogotá L1, 2021

In the Table 9 The water sources closest to or intercepting each section of the PMAS are shown below.

#### Table 9 – Water Sources by Tranche

| Section | Abci         | Abcisedo Location |  | on   | River/Canal                                       | Location in the |
|---------|--------------|-------------------|--|--|---|-----------------|
|         | From         | То                | From   | То   | Identified  | AID             |
| WF1     | km 1+700     | km 3+760          | Canal Cundinamarca                           | Villavicencio                                  | Rio Bogotá  | No              |
|         |              |                   | (Cra 100) at 54S Street, connecting with 43S | Avenue (Cll 43S)<br>with Ciudad Cali           | Canal   | No              |
|         |              |                   | Street.                                      | Avenue (Cra 86)                                |   | N i             |
|         |              |                   |  |  | Canal Tintal II                                   | Yesi            |
| WF2     | Km 3+760     | Km 7+800          | 43S Street with Carrera                      | Calle 26S con                                  | No presence of                                    | -               |
|         |              |                   | 86 AV. (AV. Cludad Call)                     | Carrera / T D                                  | bodies of water                                   |                 |
| WF3     | Km 7+800     | Km<br>11+870      | 26S Street with Carrera<br>71D               | Carrera 30 Av.<br>with Calle 8S                | Canal Rio Seco<br>Canal Albina<br>Canal Rio Fucha | Yes             |
| WF4     | Km<br>11+880 | Km<br>16+060      | Av Carrera 30 con Calle<br>8S                | Av. Carrera 14 (Av<br>Caracas) con<br>Calle 13 | No presence of<br>bodies of water                 | _               |
| WF5     | Km<br>16+060 | Km<br>19+950      | Av. Carrera 14 (Av<br>Caracas) con Calle 13  | Av. Carrera 14 (Av<br>Caracas) con<br>Calle 45 | Canal Arzobispo                                   | Si              |
| WF6     | Km<br>19+950 | Km<br>23+900      | Av. Carrera 14 (Av<br>Caracas) con Calle 45  | Av Carrera 14 con<br>Calle 80                  | No presence of<br>bodies of water                 | _               |

Source: Consorcio Ambiental Metro Bogotá L1, 2021

## 7.3.1.2.2 Water Quality

For the characterization of water quality in the project's area of influence, surface water monitoring was used to analyze the following physical parameters: temperature, electrical conductivity, dissolved solids, settleable solids, total suspended solids, turbidity, hydrocarbons, pH and flow rates, and for chemical parameters: dissolved oxygen, chemical oxygen demand, biochemical oxygen demand, total nitrogen, total phosphorus, surfactants, oils, grease and metals. In addition, the Langelier index, buffer capacity and water quality index were also calculated.

The monitoring was conducted on November 4, 5, 8 and 9, 2021 in seven water bodies: Canal Albina, Canal Arzobispo, Canal Río Fucha, Canal Río Seco, Canal Cundinamarca, Río Bogotá, Canal Tintal II, which are located along the route.

Sampling was performed upstream and downstream of each of the water bodies, the following table shows the reference number assigned by the laboratory for each water body and the georeferenced data.

| Id Sample     | Sampling Point                      | Cota   | Geographica  | l Coordinates | Plane Coordinates<br>National Origin |             |  |  |
|---------------|-------------------------------------|--------|--------------|---------------|--------------------------------------|-------------|--|--|
|               |                                     | (พรกก) | Length       | Latitude      | Este                                 | Norte       |  |  |
| BO2109466.003 | Canal Albina<br>upstream            | 2555   | 74°07'04.50" | 04°35'57.60"  | 4876043.577                          | 2066318.554 |  |  |
| BO2109466.004 | Canal Albina<br>downstream          | 2556   | 74°07'01.56" | 04°36'01.10"  | 4876134.310                          | 2066425.857 |  |  |
| BO2109441.001 | Canal Arzobispo<br>upstream         | 2580   | 74°04'04.90" | 04°37'42.40"  | 4881580.815                          | 2069527.220 |  |  |
| BO2109441.002 | Canal Arzobispo<br>downstream       | 2578   | 74°04'08.50" | 04°37'45.70"  | 4881470.078                          | 2069628.690 |  |  |
| BO2109590.004 | Canal Río Fucha<br>upstream         | 2556   | 74°06'32.36" | 04°35'50.31"  | 4877033.280                          | 2066093.221 |  |  |
| BO2109590.003 | Canal Río Fucha<br>downstream       | 2557   | 74°06'45.39" | 04°35'56.37"  | 4876632.189                          | 2066279.877 |  |  |
| BO2109590.002 | Canal Río Seco<br>upstream          | 2557   | 74°07'23.99" | 04°36'10.47"  | 4875443.822                          | 2066714.584 |  |  |
| BO2109590.001 | Canal Río Seco<br>downstream        | 2556   | 74°07'20.70" | 04°36'13.60"  | 4875545.319                          | 2066810.510 |  |  |
| BO2109466.001 | Canal<br>Cundinamarca<br>upstream   | 2542   | 74°10'46.10" | 04°39'00.14"  | 4869226.566                          | 2071933.320 |  |  |
| BO2109466.002 | Canal<br>Cundinamarca<br>downstream | 2540   | 74°11'06.80" | 04°38'43.10"  | 4868588.071                          | 2071411.275 |  |  |
| BO2109550.001 | Río Bogotá<br>upstream              | 2543   | 74°11'44.16" | 04°39'06.78"  | 4867438.495                          | 2072140.168 |  |  |

#### Table 10 – Identification of sampling points



| Id Sample     | Sampling Point                | Cota   | Geographica  | I Coordinates | Plane Coordinates<br>National Origin |             |  |  |
|---------------|-------------------------------|--------|--------------|---------------|--------------------------------------|-------------|--|--|
|               |                               | (MSNM) | Length       | Latitude      | Este                                 | Norte       |  |  |
| BO2109550.002 | Río Bogotá<br>downstream      | 2543   | 74°12'11.16" | 04°38'43.10"  | 4866605.578                          | 2071414.622 |  |  |
| -             | Canal Tintal II<br>upstream   | 2543   | 74°10'16.00" | 04°37'44.30"  | 4870149.879                          | 2069603.574 |  |  |
| -             | Canal Tintal II<br>downstream | 2543   | 74°10'19.90" | 04°37'51.60"  | 4870030.115                          | 2069827.875 |  |  |

- Dry point: The points were inspected, and it was found that civil works of the Bogota aqueduct are being carried out; therefore,

sampling cannot be performed since there is no watercourse

Source: Consorcio Ambiental Metro Bogotá L1, 2021

From the results obtained, the following can be established:

It is evident that most of the parameters report their highest concentrations in the points of the Albina Canal, Bogotá River and the Río Seco Canal in order of predominance, while the lowest concentrations are mostly present in the Canal Río Fucha and the Canal Arzobispo, except for the coliform values that present the highest presence in the Canal Arzobispo.

Parameters such as detergents present cases in the points Canal Albina upstream and downstream, Canal Río Seco upstream and downstream and Río Bogotá upstream and downstream that exceed the maximum limit of 0.5 mg/L established in Articles 2.2.3.3.3.9.3 and 2.2.3.3.3.9. 4 of Decree 1076 of 2015 of the MADS for human and domestic consumption, on the other hand the microbiological variables present high values, specifically total coliforms at all points exceed the maximum permissible limits of 1000, 5000 and 20000 NMP/100mL established in Articles 2. 2.3.3.3.9.3, 2.2.3.3.9.4 and 2.2.3.3.9.5 of MADS Decree 1076 of 2015 for human and domestic consumption and agricultural use, likewise thermotolerant coliforms in most points except for the upstream Cundinamarca Canal exceed the maximum permissible limits of 1000 and 2000 NMP/100mL established in Articles 2. 2.3.3.3.9.5 of MADS Decree 1076 of 2015 for human and domestic consumption and agricultural use.

The classification of waters according to their use established in Articles 2.2.3.3.3.9.3, 2.2.3.3.9.4. 10 of Decree 1076 of 2015, it is evident that the Albina Canal upstream and downstream allows livestock uses and for the preservation of flora and fauna, since the results of detergents do not allow the use of human and domestic consumption and the results of total coliforms and thermotolerants do not allow the use of human and domestic consumption and agricultural use.

The Canal Arzobispo upstream and downstream allows livestock uses and for the preservation of flora and fauna, since the results of total and thermotolerant coliforms do not allow the use for human and domestic consumption and agricultural use; the Canal Río Fucha upstream and downstream allows livestock uses and for the preservation of flora and fauna, since the results of total and thermotolerant coliforms do not allow the use for human and domestic consumption and agricultural use.

The Canal Río Seco upstream and downstream allows livestock uses and for the preservation of flora and fauna, since the results of detergents and pH do not allow the use for human and domestic



consumption and the results of total and thermotolerant coliforms do not allow the use for human and domestic consumption and agricultural use; the Canal Cundinamarca upstream and downstream allows livestock uses and for the preservation of flora and fauna, since the results of total and thermotolerant coliforms do not allow the use for human and domestic consumption and agricultural use.

Finally, the Bogotá River upstream and downstream allows livestock uses, since the results of detergents do not allow the use of human and domestic consumption and the results of total and thermotolerant coliforms do not allow the use of human and domestic consumption and agricultural use, the result of dissolved oxygen is counterproductive for the preservation of flora and fauna.

The Water Contamination Index ICOS which characterizes the level of contamination according to the conjunction of different parameters, for the ICOSUS index it is evident that there is no degree of contamination in most cases by solid suspended material, except for low degrees of contamination in the Canal Albina upstream and downstream, in the Canal Arzobispo downstream and Canal Cundinamarca upstream, and a very high degree of contamination in the Canal Cundinamarca downstream.

The ICOMO Index registers a medium degree of contamination in the points of the Canal Río Fucha upstream and downstream, in the points of the Bogotá River upstream and downstream it is classified as very high contamination and in the rest of the points it is classified as high contamination by organic matter, then the ICOpH does not present any degree of contamination in most of the samples evaluated except for the point of the Canal Río Seco upstream which is classified as a low degree of contamination by PH and Finally, based on the phosphorus content in the water bodies, a degree of Eutrophy is established for most of the points evaluated except for the points of the Bogotá River upstream and downstream, which is classified as hypereutrophic.

The national environmental regulations do not contemplate a normative value for buffer capacity, this property can be used as a tool for monitoring the quality of water bodies, since its decrease is synonymous with alterations in the ionic balance of water, which may be linked to contamination processes due to discharge of heavy metals, acids and/or salts. Buffer capacity results are in a range between 18 Molar and 21 Molar, the negative sign indicates that the buffer condition is to neutralize acids, i.e. to decrease the pH.

### 7.3.1.2.3 Water Uses

The area of influence of the PMAS network is located in the urban environment of Bogotá, which has residential coverage of more than 99% of the aqueduct service, supplied by the Empresa de Acueducto y Alcantarillado de Bogotá- EAAB, which, in turn, is supplied by three (3) systems: Chingaza System, Sumapaz System, upper basin of the Tunjuelo River and Tibitóc - North Aggregate System, located in areas distant from the area of influence of the project. Therefore, it should be noted that along the bodies intercepted by the PMAS, no catchments or uses associated with water sources are identified.



# 7.3.1.2.4 Hydrogeology

### 7.3.1.2.4.1 Inventory of groundwater points

A total of 117 groundwater points were identified in the area of indirect influence: 37 points correspond to the SDA inventory, most of which are definitively sealed, only three points remain active and with permits for exploitation, 28 points correspond to drilling carried out within the studies and of which 18 piezometers have been installed and 52 points correspond to monitoring piezometers with depths between 2.3 m and 7.76 meters, installed in the Service Stations located in the area of direct influence.

Based on the isopiezas maps, a direction of groundwater flow from east to west is observed, allowing inferring that the main aquifer recharge zone in the area is associated with the Eastern Hills and the contact zone of the Quaternary Deposits. Taking into account the behavior of the groundwater flow directions, it can be estimated that the Bogotá River is the main discharge zone of the Quaternary aquifers and the only surface stream that presents a possible direct interaction; the other surface streams in the city of Bogotá are lined and channeled in concrete, which nullifies a possible direct interaction with the Quaternary aquifers.

In order to establish the "natural" hydrochemical characteristics of groundwater prior to the development of an anthropogenic project, we use physicochemical and microbiological analyses of groundwater samples collected appropriately, in order to ensure their representativeness, and quantify their composition by determining the concentration of various constituents analyzed, mainly between 10 to 20 parameters of the more than 60 constituents that a water sample may contain. (IGME, 1985).

On October 7 and December 9, 2021 (date that corresponds to a period of excess water for the Bogotá River basin according to historical data), the collection and laboratory analysis of samples in the study area was performed, collecting a total of fourteen (14) point samples from piezometers for physicochemical and microbiological analysis of the study area, after purging the water points.

To validate the results obtained by the laboratory using the traditional ionic balance, it was found that all the samples were below the admissible error established by Custodio & Llamas (1983) taking into account the electrical conductivity of each sample analyzed ((|%CBE|) = 0.6 ± 8.7 %).

When comparing the physicochemical and microbiological database with the admissible quality criteria for human consumption (Resolution 2115 of 2007, Articles 3, 4, 6, 7 and 11), it is established that the water extracted from the sampling points should not be used directly for human consumption as it exceeds the admissible physicochemical and microbiological criteria, which is reflected in IRCA's ≥ 32.4%. Additionally, there is evidence of an anthropic effect on the aquifer, given the presence of hydrocarbons, oils and greases, Escherichia coli and total coliforms, which makes the water extracted from sampling points P-VDT-044, P-VDT-043, P-VDT-440, P-VDT-413, PT-PLMB-VDT-12, PT-CLL26-03 and PT-AV68-2 impotable and in need of analysis given the risk.

Considering the origin of the physicochemical and microbiological elements that exceed the water quality criteria established in Resolution 2115 of 2007, the parameters pH, phosphates, hydrocarbons, total

coliforms and escherichia coli can be associated with anthropogenic processes such as drains and leaks in sanitary pipes, industrial processes and hydrocarbon storage and distribution activities, which can generate increases in these parameters in groundwater, while the increase in concentrations of electrical connectivity, calcium, iron and manganese is due to natural processes of rock dissolution and cation exchanges associated with the dynamics of water in nature.

Recharge is defined as the process by which water is incorporated into an aquifer from the outside that limits it; recharge water can come from infiltration of rainfall, surface water or by transfer from another aquifer (Custodio, 1983). Other authors (Freeze and Cherry, 1979) define this phenomenon as a process by which the excess of infiltration over evaporation drains from the root zone and continues to flow downward through the unsaturated zone to the water table.

The zone where water infiltrates into the aquifer, which has soil with a high infiltration capacity or sufficiently permeable rock, is defined as the recharge area or zone.

Geomorphologically, moderately steep slopes predominate in the area, covering 61.70% of the area, followed by slightly steep slopes, which cover 18.90% of the area; the lowest percentages correspond to steeply sloping zones with 2.97% and flat zones with a percentage of 5.58%. The slope map is a quantitative and continuous variable, derived from the digital elevation model (DEM) with 12.5 m resolution.

Based on the updated geology and for the updating of the conceptual and numerical hydrogeological model, the hydrogeological units in the area of influence are classified.

Three (3) hydrogeological units are defined for the area of influence::

- A.2. Moderately productive aquifers, discontinuous or local aquifer systems.
- C.1. Minor aquifers with limited groundwater resource, local systems.
- C.2. Strata or rocks with no groundwater resource.

In the Table 11 the classification of the hydrogeological units and their main lithological and hydraulic characteristics are presented.

|      | Classification IAH   | Unit Stratigraphy                | Lithology   | K (m/d)   | S        |  |  |  |  |  |
|------|--|----------------------------------|---|-----------|----------|--|--|--|--|--|
|      | A. Rocks and sediments with essentially intergranular flow                       |                                  |   |           |          |  |  |  |  |  |
| A.1. | Aquifers with high<br>productivity, continuous<br>aquifer systems.               | Savannah Formation<br>(Qsa2)     | Regional multilayer aquifer<br>formed by clays, intercalations<br>while sandy clays and clayey<br>sands. It develops a thickness<br>of 320 m. yield from 0.1 to 5<br>lps. | 1.0 a 4.0 | 1.00E-04 |  |  |  |  |  |
| A.2. | moderately productive<br>aquifers, discontinuous<br>or local aquifer<br>systems. | Training Río<br>Tunjuelo (Qrtsa) | Free, local type aquifer<br>composed of gravels with minor<br>intercalations of clayey sands,<br>clays, organic clays and peaty<br>clays. Thickness up to 80 m            | 0.1 a 1.0 | 1.00E-03 |  |  |  |  |  |

Table 11 – Classification of hydrogeological units and their main lithological and hydraulic characteristics.



#### EXECUTIVE SUMMARY - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE TRANSFER, PROTECTION, RELOCATION AND/OR NETWORK MANAGEMENT OF THE PLMB

|      | Classification IAH  | Unit Stratigraphy                    | Lithology   | K (m/d)              | S        |  |  |  |  |  |  |
|------|---|--------------------------------------|---|----------------------|----------|--|--|--|--|--|--|
|      |   | Slope Deposits<br>(Qdp)              | Local, discontinuous aquifers,<br>formed by silts and sands.<br>Maximum thickness of 30 m.  | 0.1 a 0.5            | 1.00E-02 |  |  |  |  |  |  |
|      | B. Rocks with flow essentially through fractures, including karstic aquifers.                       |                                      |   |                      |          |  |  |  |  |  |  |
| B.1. | Highly productive<br>aquifers, continuous<br>aquifer systems.                                       | -                                    | -   | -                    | -        |  |  |  |  |  |  |
| B.2. | moderately productive aquifers, discontinuous or local aquifer systems.                             | -                                    | -   | -                    | -        |  |  |  |  |  |  |
| C    | C. Rocks and sediments with limited groundwater resources or strata with essentially no groundwater |                                      |   |                      |          |  |  |  |  |  |  |
|      |   | re                                   | sources.  |                      |          |  |  |  |  |  |  |
|      | Minor aquifers with<br>limited groundwater<br>resource (aquitard),<br>local systems.                | Formation Sabana<br>(Qsa1)           | Aquitard composed mainly of clays and silts. Thickness up to 320 m and primary porosity   | 1.0E-04 a<br>1.0E-06 | 1.00E-05 |  |  |  |  |  |  |
| C.1. |   | Formation Chía<br>(Qch1, Qch2, Qch3) | Aquitard with primary porosity,<br>locally formed by flood clays,<br>organic clays and fluvial silts.<br>Thickness between 5.0 m and<br>30 m                                | 1.0E-04 a<br>1.0E-05 | 1.00E-04 |  |  |  |  |  |  |
| 0    |   | Formation Bogotá<br>(Tib)            | Aquitard without<br>hydrogeological significance<br>composed of silty and<br>variegated claystones, with<br>lignites and greenish<br>sandstones. Thickness up to<br>1050 m. | 1.0E-05 a<br>1.0E-07 | 1.00E-06 |  |  |  |  |  |  |
| C.2. | Strata or rocks without groundwater resources (aquicludes).   | -                                    | -   |                      |          |  |  |  |  |  |  |
| 1    | ł   | K (m/d): Hydraulic Cond              | luctivity; S: Storage Coefficient.  |                      |          |  |  |  |  |  |  |

Source: Consorcio Ambiental Metro Bogotá L1, 2021

### 7.3.1.2.4.2 Analysis of Intrinsic Vulnerability to Aquifer Contamination

The assessment of intrinsic vulnerability to groundwater contamination is based on the analysis of the aquifer vulnerability index using the GOD methodology (Foster, 1987).

Vulnerability to groundwater contamination is a qualitative, relative, non-measurable and dimensionless property, which aims to establish the degree of natural defense of the system against the potential alteration of groundwater quality, established by the physical properties of the unsaturated medium, which makes it a tool for making decisions regarding the protection of this resource. Generically, the calculation of the vulnerability of an aquifer can be made qualitatively, establishing an index of very high, high, medium, low or zero vulnerability.

The intrinsic vulnerability of aquifers to contamination establishes the ease with which substances that may degrade groundwater quality enter through direct infiltration through the soil or the unsaturated zone. Foster (1987) defines vulnerability as the susceptibility of groundwater to be adversely affected by contaminant loads applied at the surface.

In the Table 12 the pollution vulnerability indexes for each of the hydrogeological units present in the area of influence are shown below.



| Hydrogeological Unit  | Vulnerability<br>Index | Degree of<br>Vulnerability |
|---|------------------------|----------------------------|
| A.1. (Aquifers with high productivity, continuous aquifer systems).               | 0.18                   | Under                      |
| A.2. (Moderately productive aquifers, discontinuous or local aquifer systems).    | 0.63                   | High                       |
| C.1. (minor aquifers with limited groundwater resource (aquitard), local systems) | 0.15                   | Under                      |

Table 12– Results of the vulnerability assessment of the hydrogeologic units using the methodology - GOD

Source: Consorcio Ambiental Metro Bogotá L1, 2021

### 7.3.1.2.4.3 Conceptual Hydrogeologic Model

The conceptual hydrogeological model for the area of influence seeks to describe the behavior of the groundwater resource in the area where the activities are planned, in order to estimate whether the activities could generate any alteration to the behavior of the groundwater resource.

The conceptual hydrogeological model establishes that the behavior of groundwater in the hydrogeological units of importance (A.1 and A.2.) that the project will intervene, is associated with local flows of little transit related to meteoric waters, whose main recharge zone is located in the foothills of the Eastern Hills and a transit towards the west where there is a discharge zone in the Bogota River. Given the lithological conditions, depth of groundwater and hydrogeological characteristics, most of the area has a low degree of vulnerability to contamination.

aking into account the hydrogeological behavior described in this chapter and the fact that there is currently no use of groundwater in the area of direct and indirect influence of the project, that the route is located in areas already intervened and urbanized and that the design includes specific interventions, it can be established that the activities planned within the framework of the current PMAS will not influence the natural hydrogeological behavior of the area.

#### 7.3.1.3 Atmospheric Component

#### 7.3.1.3.1 Meteorology

To characterize the climate of the study area, a search for information from the Institute of Hydrology, Meteorology and Environmental Studies - IDEAM, the Regional Autonomous Corporation of Cundinamarca - CAR, the District Institute of Risk Management and Climate Change - IDIGER, the District Secretariat of Environment - SDA (through the Bogotá Air Quality Monitoring Network, RMCAB) and the Bogotá Water and Sewage Company - EAAB was conducted.

Information from 34 meteorological stations was reviewed and analyzed. After verification, complementation, analysis of consistency, homogeneity and debugging of the information, the climatic characterization was defined by the information from 23 stations, which made it possible to establish the following meteorological conditions in the area of influence:

Average daily precipitation: It is inferred that, during the highest percentage of days of the period analyzed, precipitation occurs, with an average of 68.74% with events. Except for a small



percentage, the IDEAM Bogotá station recorded a higher percentage of days without precipitation.

- Average monthly precipitation: Rainfall distribution in the study area is bimodal, with a first rainy season from March to May. The second rainy season begins at the end of September, extending through November. The average annual rainfall in the study area is 1013.9 mm.
- Temperature: According to the inversely proportional variation between temperature and altitude, supported by the (Atlas Climatológico de Colombia 1981-2010), the R2 value obtained is 0.9976, determining a high correlation. The equation shows the decrease in the average air temperature with increasing altitude, i.e., it represents the vertical temperature gradient, which in this case has a value of 0.66 °C/100 m, which means that for every 100 meters that the altitude increases in the study area, the temperature decreases by approximately 0.66 °C.
- Mean monthly temperature: In general, the multiannual mean monthly temperature in the study area is 15.4 °C. The mean temperature in the area is very uniform, with values ranging from 13.7 °C (monthly mean minimum recorded in January at the Venado Oro Vivero station) to 16.2 °C (monthly maximum recorded in May at the Jardín Botánico station), with a 2.5 °C amplitude.
- Average maximum and average minimum temperature: It is inferred that the extreme minimum temperature is reported in the month of August (11.6 °C); on the other hand, the average maximum temperature is recorded in the month of December (20.9 °C) and the Average multiannual temperature, In general, the average multiannual temperature ranges between 13.4 °C and 16.4 °C.
- Spatial distribution of temperature: The lowest average multiannual temperature is 14.6 °C and is found in sections 4 and 5 of the project. On the other hand, towards the north and south western side (section 6 and sections 1, 2 and 3, respectively) there are average temperatures between 15 - 15.7 °C.
- Wind: Predominant winds come from the northeast, and to a lesser extent from different directions, coming from the east, west and north, among others. Speeds predominate between the range of 1.5 and 2.5 m/s, followed by speeds between 2.5 and 3.5 m/s; and to a lesser extent, winds between 0.5-1.5 m/s and periods of calm (speed below 0.5 m/s). Winds greater than 5.5 m/s are recorded less frequently, as well as speeds between 4.5 and 5.5 m/s.
- Relative humidity: The average annual relative humidity is 73.05%. The lowest average value occurs in September (70.05%), followed by August, February, January and July, while the highest value is recorded in November (78.29) followed by May and April.
- Atmospheric pressure: The hourly behavior of the atmospheric pressure, which varies regularly in a 12-hour period, presenting two (2) maximums: at 10 am and 10 pm and two (2) minimums, being the lowest at 4 pm, and the next one around 4 am and the monthly average pressure in the stations of the area of influence fluctuates between 556.4 mm Hg (in December) and 564.3 mm Hg (in May), with an amplitude of 7.9 mm Hg.



- Solar radiation: In general, the highest radiation values fluctuate between 400 and 600 Wh/m2 and occur between 9 am and 2 pm, extending until 3 pm in July.
- Solar brightness: The average monthly values of solar brightness show that, during the year, maximums predominate from December to March and there is another peak of solar brightness, although less predominant than the previous one, from July to August. On average, the number of sun-hours varies between 3.1 and 5.4 during the day.
- Cloudiness: The average monthly multi-year cloudiness value for the project's area of influence is 2 octas, which is a slightly cloudy sky. In general, daily cloudiness values fluctuate between slightly cloudy (1) and partly cloudy (4).
- Evaporation and Potential Evapotranspiration: In general, as the number of hours of sunshine increases, so does evaporation and potential evapotranspiration, and in inverse relation to the relative humidity of the atmosphere and precipitation. It is also evident that both evaporation and potential evapotranspiration between January and March are higher than in the other months of the year, being the dry period in which the greatest volume of water is transformed into vapor.

Climatic zoning: The project study area ranges from semi-humid cold to semi-arid cold. In general, in the area of influence of sections 1 and 2 it is categorized as semi-arid cold and towards the eastern side of the project, from sections 3 to 6 it is in the semi-humid cold category.

# 7.3.1.3.2 Identification of Emission Sources

Ccording to the information issued by the District Environmental Secretariat, there are 333 fixed sources within the area of influence, 175 operate with boilers, 27 with industrial stoves, 99 with ovens, 16 roasters, 5 dryers, among others (drying tower, thermosetting branch, kettle, pelletizer, cabin, etc.). In ANNEX L1T1-CON-AMB-PN-0013\_A07/7\_3Atmospheric the inventory of these, differentiating them for each of the sections established for the EIAS.

Regarding mobile sources, vehicle gauging was performed during a period of twenty-four (24) continuous hours, on a working day and holiday, on the roads in the area of influence of the project (ANNEX L1T1-CON-AMB-PN-0013\_A07/7\_3Atmospheric).

### 7.3.1.3.3 Air Quality

To determine the current condition of air quality in the area of influence of the PMAS, we took into account the monitoring carried out as part of the update of the PLMB EIAS in 2021, which allowed us to establish that:

More than 90% of the samples did not exceed the permissible level established in MADS Resolution 2254 of 2017 (75 µg/m3 for a 24-hour period), exceedances were only generated in a single day at 14 of the 30 stations. It is very likely that PM10 concentrations are influenced by the resuspension of particulate matter generated by demolition, demolition and construction waste piling and incomplete combustion processes of vehicles or heavy machinery.

Given the location of the monitoring stations and the predominant wind directions during the 18 days of the campaign, it is possible that pollutants are dragged from the western zone to the eastern zone where the central zone of the capital is located, since wind speeds are high enough to generate dragging of pollutants, in addition to this, the winds coming down from the eastern hills collide with the air masses coming from the west, which allows greater mixing and/or dispersion capacity.

Most of the Air Quality Indexes generated were classified with quality between "good" and "acceptable" for all the pollutants evaluated in some stations, establishing that the activities carried out in the monitored areas do not generate direct impact in terms of the proliferation of emissions; therefore, there are no concentrations that could affect the health of receptors or negatively impact the environment. However, it is worth noting that the AQI's calculated for the stations located in the locality of Bosa and Kennedy reached "Very Harmful to Health" and "Harmful to Sensitive Population" quality levels"."

# 7.3.1.3.4 Environmental Noise

With regard to environmental noise in the area of influence of the PMAS, based on the results of the environmental noise monitoring conducted for the PLMB EIAS Update, it is evident that the sound pressure levels recorded in the campaign come from sporadic noise emission sources, such as: the passage and whistles of vehicles, police control with whistles, the passage of ambulances, the presence of informal vendors, and commerce along the route (from point M3 to M29). It is important to note that no permanent noise sources were perceived during the monitoring; therefore, it is inferred that the results are in accordance with the normal characteristics of the environment and the daily tasks carried out in the study area.

### 7.3.2 Biotic Environment

### 7.3.2.1 Strategic, sensitive and/or protected area ecosystems

A validation of cartographic and bibliographic information was conducted for the area of direct biotic influence, where it was determined that there are NO overlaps with strategic and sensitive ecosystems and/or protected areas such as: SINAP National System of Protected Areas, Complementary Areas for Conservation, SINAP Priorities and Sensitive Ecosystems such as the Urban Wetlands Complex of the Capital District of Bogota.

### 7.3.2.2 Principal Ecological Structure – EPP

The Main Ecological Structure - EEP is defined according to Decree No. 555 of December 29, 2021 "By which the general revision of the Land Management Plan of Bogota is adopted" Article 41 defines the Main Ecological Structure as the organizer of the territory and guarantor of the ecosystemic balances for an occupation model based on regional environmental sustainability. This structure is constituted by the set of biotic and abiotic elements that support the essential ecological processes of the territory, whose main purpose is the preservation, conservation, restoration, use and sustainable management of renewable natural resources, which provide the support capacity for the socioeconomic development of the populations. It is configured from the integration of areas of natural and anthropic origin, which



maintain a significant environmental offer for its inhabitants and other forms of life in the city and the region.

Thus, for the project in question, it was determined which areas of the main ecological structure of Bogotá could be affected, in the case of the Table 13, the components that are present within the area of indirect influence are detailed below.

# Table 13– Main Ecological Structure of the IIA

| Component            | Category                                     | Element                           |
|----------------------|--|-----------------------------------|
| Conservation areas   | District protected areas                     | District Wetland Reserves         |
| Areas of Special     | Water system                                 | Natural bodies of water           |
| Ecosystem Importance |  | Artificial bodies of water        |
| Complementary        | Contemplative Parks Contemplative Parks      | Contemplative Parks Contemplative |
| Conservation Area    | and the Structuring Network that are part of | Parks and the Structuring Network |
|                      | the Main Ecological Structure and Edge       | Network that are part of the Main |
|                      | Parks  | Ecological Structure              |
|                      |  | Edge Parks                        |

#### Source: Consorcio Ambiental Metro Bogotá L1, 2022

### 7.3.2.3 Terrestrial Ecosystems

### 7.3.2.3.1 Holdrige life zone

According to Holdrige, the area of influence for the flora component is located in two vegetation formations: the first corresponds to low montane dry forest (bs-MB) with precipitation between 500 and 1000 mm, biotemperature between 12 and 18 °C and altitudes between 2000 and 3000 meters above sea level, occupying 95.42% of the area of indirect flora influence (258.93 ha) and 92.88% of the area of direct influence (139.73 ha). The second corresponds to low montane moist forest (bh-MB) with precipitation between 1000 and 2000 mm, biotemperature between 12 and 18 °C and altitudes between 2000 and altitudes between 2000 and 3000 meters above sea level, occupying 4.58% of the area of indirect influence (27.84 ha) and 7.12% of the area of direct influence (10.72 ha).

7.3.2.3.2 Climate Zones and Subzones Bogotá D.C. Plant Cover Manual, proposed by the

### Bogotá Botanical Garden (2020)

The Bogotá D.C. Vegetation Cover Manual, proposed by the Bogotá Botanical Garden (2020), mentions that the landscape designs proposed for the city should strengthen the Main Ecological Structure in terms of its ecological functions of connectivity, climate regulation, habitat provision, and in general, improve the environmental conditions of the Main Ecological Structure and the Public Space System associated with tree planting, urban landscaping and ecological rehabilitation.

For the area of influence of the flora component, subzone Z3.1 predominates, which is characterized by 873.36 mm of precipitation, very low tree density and low building density. (Table 14).



| Urban Climate Zone within the<br>First Line of the Bogota Subway |                              | Area of indirec<br>compo | ct influence flora<br>nent (All) | Area of direct influence of flora<br>component (AID) |         |  |  |
|--|------------------------------|--------------------------|----------------------------------|--|---------|--|--|
|  | The Ene of the Begeta Cashay |                          | %                                | ha   | %       |  |  |
|  | Z 1,1                        | 0.43                     | 0.15%                            | 0.25   | 0.17%   |  |  |
| ZONE 1   | Z 1,2                        | 1.89                     | 0.65%                            | 1.21   | 0.80%   |  |  |
|  | Z 1,3                        | 5.25                     | 1.86%                            | 3.41   | 2.27%   |  |  |
|  | Z 2,1                        | 4.16                     | 1.48%                            | 3.02   | 2.01%   |  |  |
| ZONE 2   | Z 2,2                        | 6.24                     | 2.13%                            | 4.55   | 3.03%   |  |  |
|  | Z 2,3                        | 7.35                     | 2.26%                            | 4.10   | 2.72%   |  |  |
|  | Z 3,1                        | 63.54                    | 22.32%                           | 48.43  | 32.19%  |  |  |
| ZONE 3   | Z 3,2                        | 45.69                    | 16.18%                           | 42.79  | 28.44%  |  |  |
|  | Z 3,3                        | 40.78                    | 14.32%                           | 36.43  | 24.21%  |  |  |
|  | Z 4,1                        | 8.52                     | 3.02%                            | 0.05   | 0.03%   |  |  |
| ZONE 4   | Z 4,2                        | 14.51                    | 5.12%                            | 0.44   | 0.29%   |  |  |
|  | Z 4,3                        | 49.46                    | 17.46%                           | 3.33   | 2.21%   |  |  |
|  | Z 5,2                        | 0.02                     | 0.01%                            | 0.00   | 0.00%   |  |  |
| ZONE 5   | Z 5,3                        | 14.21                    | 5.44%                            | 0.00   | 0.00%   |  |  |
| ZONE 6   | Z 6,1                        | 3.76                     | 1.33%                            | 0.14   | 0.10%   |  |  |
| WATER BO   | DDIES                        | 20.95                    | 6.26%                            | 6.26%  | 1.51%   |  |  |
| Tota   |                              | 286.77                   | 100.00%                          | 150.44   | 100.00% |  |  |

#### Table 14 - Subzonas climáticas área de influencia componente flora

Source: Consorcio Ambiental Metro Bogotá L1, 2021

#### 7.3.2.3.3 Biomes and Ecosystems

The crossing was performed with the 2017 Ecosystems layer (IAvH, 2017), for the area of influence of the flora component has four (4) biomes: with a representativeness of 40.10% (127. 95 ha) of the Andean High Andean Orobiome High Andean Eastern Cordillera followed by the Andean Azonal Orobiome High Andean Eastern Cordillera followed by the Andean Eastern Cordillera with 33.33% (94.98 ha), Helobiome High Andean Eastern Cordillera with 24.58% (57.74 ha) and finally with 1.99% (4.10 ha) the Hydrobiome High Andean Eastern Cordillera.

| Bioma   | Area of indirect<br>influence |         | Area of direct<br>influence |         |
|---|-------------------------------|---------|-----------------------------|---------|
|   | ha                            | %       | ha                          | %       |
| High Andean Helobioma eastern cordillera                          | 57.74                         | 24.58%  | 2.75                        | 1.83%   |
| Hidrobioma Altoandino cordillera oriental                         | 4.10                          | 1.99%   | 0.16                        | 0.11%   |
| High Andean Andean Orobioma eastern cordillera                    | 127.95                        | 40.10%  | 88.56                       | 58.86%  |
| High Andean Andean Azonal Orobioma High Andean eastern cordillera | 94.98                         | 33.33%  | 58.98                       | 39.20%  |
| Total   | 286.77                        | 100,00% | 150.44                      | 100,00% |

Source: Consorcio Ambiental Metro Bogotá L1, 2021

Four (4) biomes and 27 ecosystem units were identified in the area of influence, the most representative ecosystems correspond to the road network and associated territories - road dividers of the Andean high Andean orobiome and the Eastern Cordillera, equivalent to 21.04% (49.29 ha) of the area of indirect



influence and 32.68% (49.17 ha) of the area of direct influence for the flora component. 68% (49.17 ha) of the area of direct influence for the flora component and the ecosystem of urban parks of the high Andean helobioma of the eastern cordillera with a representativeness of 18.53% (43.41 ha) of the area of indirect influence and 0.45% (0.30 ha) of the area of direct influence.

### 7.3.2.4 Land Coverage

With the help of Geographic Information Systems (GIS), an interpretation and classification of land cover throughout the entire area of influence of the Bogotá Metro L1 project was carried out using the LIDAR satellite image used for this purpose, in which 9 types of coverages were identified taking into account the Corine Land Cover (CLC) coverage classification (IDEAM, 2010) and the classification of coverages made in the methodology of the Ordination and Management Plan of the Hydrographic Basin (POMCA) of the Nare River (MINAMBIENTE, 2017). The coverage with the greatest extension is Road network with 78.78 ha (33.37%) followed by Urban parks with 95.85 ha (27.75%) and in third place Capital city with 66.57 ha (25.70%).

### 7.3.2.5 Vegetation Area of Indirect Influence

In the framework of the development of the First Line of Metro de Bogotá - PLMB project, initially a preliminary analysis of the existing vegetation for the study area was carried out according to the SIGAU platform, this information allowed to have an estimate of how many individuals could exist in the area. Under this framework, a 100% forest inventory was carried out for the study area of the entire road corridor. In order to carry out a more detailed floristic characterization of the area, vegetation transects were carried out along the corridor to identify important species and their possible behavior in the area.

However, since the activities related to the Environmental and Social Management Plan - PMAS for the Relocation of Networks will begin prior to the activities associated with the viaduct works, the procedures and/or permits associated with the forestry component will be requested only for the forest individuals that could be affected by the network relocation activities. This in order to avoid reprocessing or delays in project activities.

#### 7.3.2.6 Floristic characterization of individuals associated with the specific intervention area

Based on the forest inventory and the network designs, it was possible to identify the forest individuals that would actually be affected by the execution of the activities of the Environmental and Social Management Plan - PMAS for the Plan for the transfer, protection, relocation and/or management of networks on which the procedures and/or permits associated with the forestry component will be initiated in advance of the construction of the viaduct. As of the date of this document, 121 forest individuals will be affected by the networks; according to the technical information provided, the number of additional individuals that are close to those that will be affected (2 meters away) was established; the floristic characterization of the area of specific intervention was developed by sections, which is presented in the following section. It is worth noting that the details of the affected individuals are presented in Chapter 7.4.



| Section | If affected by<br>networks | Affected by<br>networks | Total |
|---------|----------------------------|-------------------------|-------|
| WF1     | 33                         | 9                       | 42    |
| WF2     | 138                        | 21                      | 159   |
| Av. 68  | 85                         | 33                      | 118   |
| WF3     | 32                         | 4                       | 36    |
| WF4     | 66                         | 19                      | 85    |
| WF5     | 95                         | 13                      | 108   |
| WF6     | 53                         | 22                      | 75    |
| Total   | 502                        | 121                     | 623   |

#### Table 16 – Summary of individuals who would or would not be affected by networking activities

Source: Consorcio Ambiental Metro Bogotá L1, 2021

#### 7.3.2.7 Inventory of green áreas

The inventory of green areas carried out in the area of direct influence of the relocation of the networks is presented. It should be noted that no balance of green areas will be carried out for the network ESMP because it does NOT provide for the implementation of hardening of green areas currently identified. This taking into account that the areas that would be intervened will be left in the same or better condition than they were before the development of the network relocation activities. In Annex L1T1-CON-AMB-PN-0013\_A08 / 8 \_1 Flora, the calculations, Shapefile and plans associated to the green areas are detailed.

#### 7.3.2.8 Epiphytes

For the characterization of the epiphyte species, it was necessary to collect information to obtain data on the richness, abundance and distribution of these species within the project intervention area.

As a result of the characterization of vascular and non-vascular wild flora species, a total of 537 trees were evaluated, distributed within five (5) coverages corresponding to Other urban green areas (Ozvu), Capital city (Cc), Urban parks (Pu), Water bodies of urban areas (Rca), Road dividers (Sv), and other urban areas (Rca).

| Туре      | Vascular         | Non Vascular |
|-----------|------------------|--------------|
| WEALTH    | 4                | 7            |
| ABUNDANCE | 114 iindividuals | 135541 cm2   |

#### Table 17 – Especies de flora vascular y no vascular registradas.

Source: Consorcio Ambiental Metro Bogotá L1, 2021

#### 7.3.2.9 Fauna

Based on the information obtained in the field from the records by cover of each species within each of the taxa, it is possible to learn about the affinity or habitat preferences of each taxon in particular and of the fauna in general.

# 7.3.2.9.1 Avifauna

According to sampling and interviews conducted for the area of influence, the wild bird community in the area is composed of 52 species (Annex L1T1-CON-AMB-PN-0013\_A08 / 8\_3 Fauna), belonging to 22 families and 11 orders. The most diverse order is Passeriformes, with 30 species in 10 families, which represent 57% of the total number of birds recorded; these data are consistent with those reported for Colombia, as it is the taxon with the greatest diversity of species. The remaining orders make up 43% of the birds recorded, with a richness of less than or equal to four species.

# 7.3.2.9.2 Herpetofauna

For the herpet community in the area of influence, one species of amphibian (Dendropsophus molitor) was reported through bioacoustic records and one species of reptile was recorded through informal interviews (Annex L1T1-CON-AMB-PN-0013\_A08 / 8\_3 Fauna). By means of the Visual Encounter Strange Encounter (VES) method, despite carrying out a sampling effort suitable for this group, NO herpet species were recorded.

### 7.3.2.9.3 Mastofauna

From the acoustic recordings, three (3) species of insectivorous bats were detected: Eumops glaucinus belonging to the Molossidae family; as well as Aeroestes cinereus and Myotis nigricans of the Vespertilionidae family. This species richness represents 15% of the chiropterofauna reported for the city Bogotá D.C. (Acosta-Cala, 2019; SIB Colombia, 2021; Muñoz-Saba, et al, 2021).

In addition to the bioacoustic records, through informal interviews, the following species were recorded in wf 1: Didelphis pernigra, Neogale frenata and in wf 3 the species Didelphis marsupialis (common chucha).

#### 7.3.3 Environmental and Management Zoning

For the preparation of the environmental zoning, a list of the physical, biotic and socioeconomic environments of the area of interest for the project implementation is presented, in accordance with the attributes, parameters and weightings assigned according to intrinsic characteristics and environmental, social and/or economic and cultural services. The above analysis complemented with the legal and regulatory framework.

With the result of the sensitivity analysis of each one of the components analyzed and taking into account what was exposed by (Delgado, 2012), the arithmetic summation was performed, as shown in the Table 18, the environmental sensitivity obtained is distributed between high, medium and low ranges.

| Table 18 - | <ul> <li>Sensitivity</li> </ul> | ranges | in final | environmental | zoning |
|------------|---------------------------------|--------|----------|---------------|--------|
|------------|---------------------------------|--------|----------|---------------|--------|

| Range | Sensitivity |
|-------|-------------|
| 1 - 4 | Very low    |
| 5 - 8 | Low         |



| Range   | Sensitivity |
|---------|-------------|
| 9 - 12  | Media       |
| 13 - 16 | High        |
| 17 - 20 | Very high   |

Source: Consorcio Ambiental Metro Bogotá L1, 2021

Therefore, the intermediate sensitivities of each rated item are crossed to obtain an environmental zoning for the evaluated study area, resulting in a sensitivity rating according to the abiotic, biotic and socioeconomic environments, in addition to the legal and regulatory framework, as follows in the. Figure 17. In accordance with the Table 19 low sensitivity was predominant in the project area, with 77.1%, of which section 3 presented the highest percentage of coverage due to sensitivity (Ver Table 20).

| Environmental<br>Zoning | Área (ha) | %    |
|-------------------------|-----------|------|
| Low                     | 43,46     | 18,7 |
| Media                   | 178,65    | 77,1 |
| High                    | 9,71      | 4,2  |
| Total                   | 231,82    | 100  |

Source: Consorcio Ambiental Metro Bogotá L1, 2021.

| Table 20 – Final environmental zoning in the project's area of interv | ention |
|---|--------|
|---|--------|

| Section   | Área (ha) | Environmental<br>Zoning | Área (ha)    | %    |
|-----------|-----------|-------------------------|--------------|------|
| Section 3 | 0,24      |                         |              |      |
| Section 4 | 14,84     | Paia                    | <b>11 55</b> | 27.7 |
| Section 5 | 6,67      | Daja                    | 41,55        | 21,1 |
| Section 6 | 19,80     |                         |              |      |
| Section 1 | 5,47      | Media                   |              |      |
| Section 2 | 25,65     |                         |              |      |
| Section 3 | 33,05     |                         | 104.26       | 60.4 |
| Section 4 | 15,12     |                         | 104,30       | 69,4 |
| Section 5 | 17,96     |                         |              |      |
| Section 6 | 7,11      |                         |              |      |
| Section 1 | 3,80      |                         |              |      |
| Section 3 | 0,07      | Alta                    | 4.26         | 2.0  |
| Section 4 | 0,34      |                         | 4,30         | 2,9  |
| Section 5 | 0,14      |                         |              |      |
| Total     | 150,27    | Total                   | 150,27       | 100  |

Source: Consorcio Ambiental Metro Bogotá L1, 2021.





Figure 17 Final environmental zoning of the project Source: Consorcio Ambiental Metro Bogotá L1, 2021

### 7.3.3.1 Environmental Management Zoning

According to the results obtained from the environmental zoning and generating the reclassification according to the categories of intervention, restriction and exclusion. From the generated areas it can be identified that intervention areas with restrictions prevail. (See Table 21 and Table 22), The areas of intervention with medium restriction represent 77.1% of the total intervention area, mainly in sections 2 and 3, followed by the areas of intervention with low restriction with 18.7%, mostly represented in section 4. It should be noted that there are no exclusion areas within the management zoning, since there are no fragile zones within the intervention area in which no activity of any kind can be developed. In the Figure 18 the graphical representation for the resulting environmental management zoning is presented...

| Table 21 – | Management | zoning for | or the | intervention | area |
|------------|------------|------------|--------|--------------|------|
|------------|------------|------------|--------|--------------|------|

| Management Zoning                          | Área (ha) | %    |
|--|-----------|------|
| Intervention areas with low restriction    | 43,46     | 18,7 |
| Intervention areas with medium restriction | 178,65    | 77,1 |
| Intervention areas with high restriction   | 9,71      | 4,2  |
| Total                                      | 231,82    | 100  |

Source: Consorcio Ambiental Metro Bogotá L1, 2021



| Section   | Área (ha) | Zonificación de Manejo    | Área (ha)                            | %                     |  |
|-----------|-----------|---------------------------|--------------------------------------|-----------------------|--|
| Section 3 | 0,24      |                           |                                      |                       |  |
| Section 4 | 14,84     | Intervention areas with   |                                      |                       |  |
| Section 5 | 6,67      | low restriction           | 41,55                                | 27,7                  |  |
| Section 6 | 19,80     |                           |                                      |                       |  |
| Section 1 | 5,47      |                           |                                      |                       |  |
| Section 2 | 25,65     |                           |                                      |                       |  |
| Section 3 | 33,05     | Intervention areas with   |                                      |                       |  |
| Section 4 | 15,12     | medium restriction 104,36 | medium restriction 104,36            | 69,4                  |  |
| Section 5 | 17,96     |                           |                                      |                       |  |
| Section 6 | 7,11      |                           |                                      |                       |  |
| Section 1 | 3,80      |                           |                                      |                       |  |
| Section 3 | 0,07      | Intervention areas with   | tion areas with<br>prestriction 4,36 | tervention areas with |  |
| Section 4 | 0,34      | high restriction 4,36     |                                      | 2,9                   |  |
| Section 5 | 0,14      |                           |                                      |                       |  |
| Total     | 150,27    | Total                     | 150,27                               | 100                   |  |

Table 22 – Management zoning for the intervention area

Source: Consorcio Ambiental Metro Bogotá L1, 2021



Figure 18 Management Zoning



Source: Consorcio Ambiental Metro Bogotá L1, 2021

#### 7.4 DEMAND FOR, USE, EXPLOITATION AND/OR IMPACT ON NATURAL RESOURCES

The project will require for its execution the use, exploitation and/or impact of the following natural resources:

#### 7.4.1 Surface Water an Groundwater

For the development of network transfer activities, it is not required to collect water from natural surface or subway watercourses.

### 7.4.2 Staff water consumption

Total potable water consumption for the project is estimated at 355 m3 for each of the work fronts. Water for human consumption in compliance with the hydration instructions will be supplied through the purchase of natural water and evidence of purchase will be provided through purchase invoices (see hydration instructions in Annex 8 of the OSH Plan).

#### 7.4.3 Industrial water consumption

Where necessary, the provision of water for the development of construction activities will be carried out through the contracting of water tanks from authorized suppliers that have the respective water collection permits issued by the Bogota Aqueduct, Sewage and Sewerage Company E.S.P. Currently for the network transfer works, the supplier Acualianza (Annex L1T1-CON-AMB-PN-0013\_A12 / 12\_14 Documentation of water supplier) is contemplated, which guarantees supply capacity for the project without affecting the community.

Water use for the different activities is as follows: Granular material for installation of networks (1556.2422 m3); Granular material for reconformation of pavements and sidewalks (840.5511 m3), Concrete for manholes, boxes and pipe installation (19.61 m3), Functional tests (1019.5 m3) and Excavation (153.58 m3).

#### 7.4.4 Rainwater Use

If possible, rainwater will be collected in the temporary facilities using 55-gallon tanks. The plan is to collect 110 gallons per week during the rainy season and then use it for activities that do not require potable water, such as wetting access roads, wetting stockpiled granular materials, washing facilities, and wetting during construction activities such as demolition, thus controlling particulate matter emissions.

#### 7.4.5 Wastewater

As for the sanitary units and the wastewater resulting from the cleaning and disinfection of these will be managed through specific suppliers for whom their wastewater will be treated by a third party who are also authorized by the AAC- (Annex L1T1-CON-AMB-PN-0013\_A12 / 12\_13 Documentation suppliers portable sanitary units).



The approximate volume of domestic wastewater generated in the network transfer activities is 27300 kg/project.

### 7.4.6 Construction materials

The following quantities of materials are estimated for the project: Backfill with filler (33883.9 m3); Asphalt (9158.18 m3); Concrete (3943.63 m3) and Backfill with base and granular subbase (28020.48 m3). The above calculations of the quantity of materials were made using information provided by the area in charge of the designs for the transfer, protection, relocation and/or management of PLMB networks; values for different materials are not recorded in the tables because they will not be used in the section.

Regarding the use of asphalt mixtures modified with Recycled Rubber Grain GCR, strict compliance will be given to carry out its installation based on what is established in the framework of the Environmental Policy of the Capital District, Solid Waste (Decree 265 of 2016) that promotes the use and/or valorization of used tires. According to the total amount of asphalt (9158.18 m3) that will be used in the transfer, protection, relocation and/or management of PLMB networks, 2747.45 m3 of Recycled Rubber Grain will be allocated.

### 7.4.7 Solid waste

#### 7.4.7.1 Conventional

Taking into account that the duration of the activities to be carried out is 33 months on average and a population equivalent to 360 workers is foreseen for the transfer, protection, relocation and/or management of PLMB networks, the level of complexity was evaluated as Low. The total waste and the composition of each type of waste is as follows: Organic 2473 Kg/month; Common 25738 Kg/month; Paper 18168 Kg/month; Cardboard 7822 Kg/month; Plastic 12869 Kg/month and Glass7949 Kg/month, for a total of 75019 Kg/month.

Disposal of non-usable conventional waste will be done in accordance with the guidelines defined by the companies providing the service, taking into account the collection routes and schedules in each section. For usable waste, it will be done through the company Ecoplanet soluciones AR SAS (Annex L1T1-CON-AMB-PN-0013\_A12 / 12\_11 Documentation of recycling managers).

#### 7.4.7.2 Hazards

The generation of hazardous waste during the transfer, protection, relocation and/or management of PLMB networks is associated with the operation of the camps, heavy machinery, and the handling of materials that generate RESPEL. The estimated volume of used oil for the project is 1192 kg and hazardous waste is 12313 kg. Hazardous waste disposal is handled by Industria Ambiental SAS (Annex L1T1-CON-AMB-PN-0013\_A12 / Documentation of RESPEL Manager).

#### 7.4.7.3 Handling and disposal of excavation and demolition waste material (RCD)

During the development of the activities of transfer, protection, relocation and/or management of PLMB networks, together with the technical area, activities and verifications will be established to ensure compliance with the percentage of reuse established (30%) in accordance with the standard. If the



builder does not obtain the established reuse (30%), he must justify the reason for not making full use of the waste and must report the amount reused, which must be notified to the supervision office.

### 7.4.8 Occupation of watercourse

Within the Area of Direct Influence (AID) established for the network relocation work, four (4) water bodies were identified from Villavicencio Avenue and Carrera 89B to Los Libertadores Avenue and 80th Street, which intercept the AID of the network relocation, protection, relocation and/or management plan. These water bodies are: Canal Arzobispo, Canal Rio Fucha, with its tributaries Canal Rio Seco and Canal Albina.

In accordance with the planned interventions to the networks, activities will be carried out on the Rio Seco and Albina canals in the project's AID. Activities are planned for the aqueduct and storm sewer network in the Rio Seco canal, and in the Albina canal, the installation of an aqueduct network, an energy network and a sewer network.

#### 7.4.9 Atmospheric emissions

Emissions were calculated taking into account the following Source: EPA (https://www.epa.gov/sites/default/files/2020-10/documents/c03s03.pdf page 6). Additionally, it was calculated taking into account an estimated working time of 20 hours/day for the machinery and an approximate of 3 trips per day for dump trucks. (See air emission sources management program, Greenhouse Gas Management Program).

On the other hand, the storage of materials will be carried out within the areas established for temporary stockpiles of materials for the early transfer of nets (Annex L1T1-CON-AMB-PN-0013\_09 / Suppliers), which will comply with adequate environmental management to prevent the emission of particulate matter into the atmosphere, such as protection of granular materials with polyethylene, transportation of materials with load protection, installation of mesh in work area enclosures (See air emission sources management program: Air, Greenhouse gas management program).

#### 7.4.9.1 Emissions from Power Generation.

The estimate of emissions from electricity generation is based on 6 power plants of 75 KW, which represents a consumption for the project of 1179360 gal. It is important to note that this estimate takes into account the type of fuel (diesel) and considers CO, CO2, NOx and SOx emissions, taking into account that these are among the main greenhouse gases emitted (see GHG emissions program and atmospheric emissions program). PM10 and PM2.5 pollutants are considered due to the fact that combustion generates Particulate Matter (PM10 and PM2.5).

### 7.4.10 Forest Harvesting (Application for Permit and/or silvicultural authorization).

According to the District Secretary of the Environment, when a harvesting request is made, the right is obtained to cut, transplant or harvest isolated trees from natural or planted forests located on public land or private property that have fallen or died for natural causes, or for reasons of health or location and/or



mechanical damage that is causing damage to soil stability, water channels, sidewalks, streets, infrastructure works or buildings.

Considering the forest inventory carried out and presented in chapter 7.3.2 Characterization of the biotic environment, it was possible to identify the number of individuals that would be affected by the activities of relocation and relocation of networks; however, the information on networks is still under review, so only the wet and dry networks are affected, emphasizing that the information associated with gas networks is missing. To date, it is estimated that 121 individuals have been affected, which are presented below by section.

### 7.4.11 Silvicultural treatment

The transfer, protection, relocation and/or management of networks for the First Line of the Bogotá Subway requires the harvesting of trees located in the affected area. Annex L1T1-CON-AMB-PN-0013\_A09 / 9\_3 Forest Harvesting presents the information associated with the volume and silvicultural treatment for each of the inventoried individuals.

After identifying the phytosanitary and physical characteristics and the type of impact that the work will cause on the existing vegetation, the following treatments are proposed for all the inventoried vegetation; Felling for 111 individuals and for Blocking and Moving, 10 individuals were projected, for a total of 121 individuals affected by the netting activity as shown in Annex L1T1-CON-AMB-PN-0013\_A09 / 9\_3. Table 23.

| Section                      | Silvicultural Treatments | N° Individuals to Treat |
|------------------------------|--------------------------|-------------------------|
| \\/=1                        | Blocking and Transfer    | 0                       |
| VVE I                        | Tala                     | 9                       |
| Subtotal                     | WF1                      | 9                       |
| \M/E2                        | Blocking and Transfer    | 0                       |
| VVFZ                         | Tala                     | 21                      |
| Subtotal                     | WF2                      | 21                      |
| \\/E2                        | Blocking and Transfer    | 0                       |
| WF5                          | Tala                     | 4                       |
| Subtotal                     | WF3                      | 4                       |
| Av. Cra 68 con Brimoro movo  | Blocking and Transfer    | 5                       |
| AV. CIA 66 COIL FIIMera Mayo | Tala                     | 28                      |
| Subtotal Av. Cra 68          | 3 con 1er Mayo           | 33                      |
|                              | Blocking and Transfer    | 5                       |
| VVF4                         | Tala                     | 14                      |
| Subtotal WF4                 |                          | 19                      |
| \ME5                         | Blocking and Transfer    | 0                       |
| WF5                          | Tala                     | 13                      |
| Subtotal                     | 13                       |                         |
| \\/E6                        | Blocking and Transfer    | 0                       |
| VVFO                         | Tala                     | 22                      |
| Subtotal                     | Subtotal WF6             |                         |
| Total                        |                          | 121                     |

#### Table 23 – Total number of individuals per recommended silvicultural treatment.

Source: Consorcio Ambiental Metro Bogotá L1, 2022





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Tree compensation in the first instance will be in accordance with the number of individuals felled, in this case, as described in sections 7.4.7 and 7.4.8, i.e., to date it is estimated that one hundred twenty-one (121) trees will be affected, of which one hundred eleven (111) will be felled and ten (10) will be blocked and moved. An application for a permit and/or silvicultural intervention will be submitted to the District Secretariat of the Environment. According to the result obtained from such management in a future scenario, the Concessionaire, committed to the environment and compliance with legal obligations, will carry out the compensation taking into account what is defined by the Environmental Authority and the policies of the Safeguards of the Multilateral Agencies financing the project.

Silvicultural treatments may vary according to the administrative act granted by the Environmental Authority - SDA.

### 7.4.13 Balance of green areas

It is necessary to be clear that within the activities related to the Environmental and Social Management Plan - PMAS for the plan of relocation, protection, relocation and/or management of networks in the NO, the execution of hardening of green areas currently identified is not established, so there is NO Balance of green areas in the demand for this resource and therefore it is not necessary to compensate for their intervention. The areas that would be intervened will be left in the same or better condition than they were before the development of the network relocation activities.

#### 7.4.14 Landscape design

It should be noted that for the development of the activities of the Environmental and Social Management Plan - PMAS for the relocation, protection, relocation and/or network handling plan, there is no landscape design, since the activities will be carried out as a temporary occupation of these areas, which upon completion of the activities, will be delivered in equal or better conditions than the initial ones, and will be recorded in the follow-up and monitoring of this plan.

### 7.4.15 Permit to Collect Specimens of Biological Diversity for Non-Commercial Purposes

As part of the management measures proposed for the mitigation of the negative impacts that wildlife may suffer during the transfer of nets, the need to carry out shooing, rescue and relocation activities is established; activity focused on carrying out shooing processes that seek that individuals move by their own means and does not involve direct handling, however, there may be eventualities where it is necessary to capture and transfer the remaining fauna in the intervention sites, whether they are adults, hatchlings and/or eggs.

This being so, a permit is requested for the collection of specimens of biological diversity for noncommercial purposes, as established in Article 2.2.2.3.5.1 of Decree 1076 of 2015, where for the case of this study, temporary captures of individuals are proposed in order to remove them from the project intervention area following the methodologies that have been detailed in the Urban Fauna Management Program of the Environmental Management Plan (PMA) chapter.

### 7.5 IDENTIFICATION AND EVALUATION OF ENVIRONMENTAL IMPACTS AND RISKS

The result of the interactions of the identification of impacts in the scenario without and with project is presented in Annex L1T1-CON-AMB-PN-0013\_A11.

The evaluation is analyzed from the hierarchy of impacts, the results of which will be reflected in decisionmaking, directly in the Management and Monitoring and Follow-up Program, which will emphasize measures to prevent, mitigate, correct or compensate negative environmental impacts, especially significant impacts, in order to enhance positive environmental impacts.

Next, in the Figure 19 the general impact assessment process developed by the company is presented..



Figure 19 General impact assessment process

According to the above, the evaluations of the without-project and with-project scenarios show that the effects generated by the implementation of the activities are the difference between the modified future environmental situation and the future environmental situation as it would normally have evolved without the impact of the project, i.e., the net variation (positive or negative environmental quality).

#### 7.5.1 Impact assessment - No Project Scenario

For the scenario without a project, a total of 20 impacts were identified, which were evaluated with the 13 identified activities and a total of 167 interactions were obtained, of which five (5) were positive and 162 were negative.

Of the 162 negative interactions obtained in the scenario without project, one (1) interaction was identified with "severe" importance, 82 with "moderate" importance and 79 with "irrelevant" importance. On the other hand, of the five (5) positive interactions, three (3) were "moderate" and two (2) "irrelevant".

En la Table 24 The hierarchy of impacts is presented according to the results obtained from the evaluation exercise in the current scenario, where the impacts are organized from the most significant to the least significant. For the current case, the impacts of alteration to soil quality, alteration to species in closure and alteration to sound pressure levels are classified as the most significant.



| Table 24 – | Impact | ranking | scenario | without | project |
|------------|--------|---------|----------|---------|---------|
|------------|--------|---------|----------|---------|---------|

| Impact   | Value | Importance |
|--|-------|------------|
| Alteration to soil quality   | -52   | Severo     |
| Affectation of plant species in prohibition                                | -45   | Moderate   |
| Alteration in sound pressure levels  | -41   | Moderate   |
| Contribution to global warming   | -39   | Moderate   |
| Alteration of geomorphologic conditions                                    | -38   | Moderate   |
| Generation and/or activation of erosion and soil stability processes.      | -38   | Moderate   |
| Modification of vegetation cover and/or green areas                        | -38   | Moderate   |
| Increase in the amount of waste to be disposed of                          | -37   | Moderate   |
| Alteration to air quality  | -35   | Moderate   |
| Pressure on public services  | -32   | Moderate   |
| Impact on the Main Ecological Structure                                    | -31   | Moderate   |
| Generation of offensive odors  | -30   | Moderate   |
| Affecting habitats   | -28   | Moderate   |
| Alteration in the water transport capacity of sewage and drainage systems. | -28   | Moderate   |
| Change in wildlife composition and structure                               | -28   | Moderate   |
| Alteration in the visual perception of the landscape                       | -26   | Moderate   |
| Impact on endemic or endangered plant species.                             | -25   | Irrelevant |
| Alteration of groundwater resource availability                            | -25   | Irrelevant |
| Alteration to the quality of the groundwater resource                      | -24   | Irrelevant |
| Alteration to the quality of the surface water resource                    | -22   | Irrelevant |
| Affecting habitats   | 22    | Irrelevant |
| Alteration in the visual perception of the landscape                       | 22    | Irrelevant |
| Alteration to soil quality   | 31    | Moderate   |
| Alteration to the quality of the surface water resource                    | 34    | Moderate   |
| Modification of vegetation cover and/or green areas                        | 41    | Moderate   |

Source: Consorcio Ambiental Metro Bogotá L1

### 7.5.1.1 Environmental liabilities

In accordance with (Corantioquia, 2022) "environmental liabilities are the negative environmental impacts located and geographically delimited, which were not timely or adequately mitigated, compensated, corrected or repaired; caused by anthropic activities and that may generate a risk to human health or the environment".



According to the above definition and taking into account the characterization carried out in the project's area of influence, it is established that environmental liabilities are associated with the project's intervention areas, which would be the roads and public spaces present.

Within the activities evidenced above, it can be defined that the impact that will be negatively implied will be alteration to soil quality, this impact will be prevented, mitigated or controlled according to the methodology of the PM-AB-08 Environmental Liabilities Management Program: contaminated soils.

# 7.5.2 Impact Assessment - Scenario With Project

The impact assessment of the scenario with project was carried out based on the interactions between activities, aspects and impacts predicted for the abiotic and biotic environments. The result of the interactions in the scenario with project is presented in Annex L1T1-CON-AMB-PN-0013\_A11.

It is important to point out that, in order to identify possible variations in the relevance and importance of the impacts, according to the types of networks, four (4) ratings or evaluation matrices were made, according to the types of public utility networks to be intervened: aqueduct, sewer, gas and dry networks. The following is a description and synthesis of the ratings made and attached.

In the scenario with the project, a total of 18 activities and their interaction with the 18 impacts identified were evaluated. The analysis was carried out for the four (4) public service networks: aqueduct, sewage, gas and dry networks.

In the aqueduct network, 18 impacts were identified, which were evaluated with 17 activities and a total of 128 interactions were obtained, of these, 8 were positive and 120 negatives, and for the sewerage network, 18 impacts were identified, which were evaluated. with 17 activities and a total of 139 interactions were obtained, of these 8 were positive and 131 negatives.

In the dry networks, 18 impacts were identified, which were evaluated with 18 activities and a total of 139 interactions were obtained, of these 8 were positive and 131 negatives, and for the gas networks, 18 impacts were identified, which were evaluated with 16 activities and a total of 124 interactions were obtained, of these 8 were positive and 116 negatives.

In relation to the impacts of the abiotic environment, the impact due to the generation of offensive odors was identified, evident in the aspect of waste generation due to the activities of all types of networks, and specifically sewage, while the opening of ditches and due to the handling of these waters.

Likewise, for the impacts of the biotic environment and due to a greater representativeness, reflected in the characterization, the affectation of closed plant species obtains a rating or moderate importance in aqueduct networks and dry networks. Contrary to this, the endemic species identified in the area of influence are of low representativeness with a low rate of endemism, reflected in the evaluation through an irrelevant importance of the impact for the entirety of the networks. Regarding the affectation of the vegetation cover and/or green areas, in the aqueduct networks and dry networks, it is considered of moderate importance, since a greater number of tree individuals are intervened than in the sewage and gas networks, since these last ones the intervention is concentrated on platforms and separators. Likewise,



In general, the positive impacts caused by the project will be evident during the activities of transportation and handling of materials, structures, machinery, waste and excavation leftovers, and reconformation of green areas, works that affect the generation and/or activation of processes erosion and soil stability, as well as in the flora, fauna and landscape.

in Table 25 a summary of the activities is presented with respect to the significant impacts and the respective associated management programs that were presented for each one, from this summary it can be observed that the activities of installation and operation of camps and storage areas for materials and equipment , platform and/or pavement demolition (includes wells and inspection boxes), silvicultural management and removal of vegetation cover, and ditch excavation (manual and/or mechanical) presented the greatest number of interactions with impacts, being the most repeated among activities, the impacts of increasing the amount of waste to be disposed of and altering the quality of the soil.

| Exercise  | Impact   | Significance | Management<br>programs   |
|---|--|--------------|--|
| Installation and operation of camps and storage areas for materials and equipment | Affectation of closed species                        | Moderate     | PM_B_06. Vascular<br>and non-vascular<br>epiphytic species<br>management<br>program  |
|   | Habitat damage                                       |              | PM_B_02.<br>Management<br>program and<br>removal of<br>vegetation cover<br>and stripping   |
|   | Alteration to soil quality                           |              | <ul> <li>PM_AB_02. Material<br/>handling</li> <li>programPM_AB_07.</li> <li>Liquid fuel spill or<br/>leak management<br/>program</li> <li>PM_AB_12. Used<br/>oil management<br/>program</li> <li>PM_AB_15.</li> <li>Temporary Facility<br/>Management<br/>Program</li> </ul> |
|   | Alteration in the visual perception of the landscape |              | PM_B_02.<br>Compensation<br>management<br>program for the<br>biotic environment<br>due to landscape<br>damagePM_B_05.<br>Management<br>program for the   |

#### Table 25- Significant impacts by activity



#### EXECUTIVE SUMMARY - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE TRANSFER, PROTECTION, RELOCATION AND/OR NETWORK MANAGEMENT OF THE PLMB

| Exercise   | Impact  | Significance | Management<br>programs   |
|--|---|--------------|--|
|  |   |              | biotic environment<br>due to affectation of<br>the visual quality of<br>the landscape  |
|  | Contribution to global<br>warming                       |              | PM_AB_02. Material<br>handling<br>programPM_AB_09.<br>Noise management<br>programPM_AB_10.<br>Vibration and<br>structural noise<br>management<br>programPM_AB_15.<br>Temporary Facility<br>Management<br>Program |
|  | Increase in the amount of waste to be disposed of       |              | PM_AB_02. Material<br>handling program<br>PM_AB_03.<br>Conventional solid<br>waste management<br>program<br>PM_AB_04.<br>Hazardous waste<br>comprehensive<br>management plan                                     |
|  | Change in composition and structure of wildlife         |              | PM_B_01. Urban<br>wildlife management<br>program   |
|  | Modification of plant<br>coverage and/or green<br>areas |              | PM_B_02.<br>Management<br>program and<br>removal of<br>vegetation cover<br>and stripping   |
| Demolition of platform<br>and/or pavement (Includes<br>wells and inspection boxes) | Increase in the amount of waste to be disposed of       |              | PM_AB_02. Material<br>handling program<br>PM_AB_03.<br>Conventional solid<br>waste management<br>program<br>PM_AB_04.<br>Hazardous waste<br>comprehensive<br>management plan                                     |
|  | Alteration to air quality                               |              | PM_AB_02. Material<br>handling<br>programPM_AB_06.<br>Environmental<br>liability management  |



#### EXECUTIVE SUMMARY - ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE TRANSFER, PROTECTION, RELOCATION AND/OR NETWORK MANAGEMENT OF THE PLMB

| Exercise | Impact   | Significance | Management<br>programs   |
|----------|--|--------------|--|
|          |  |              | program.<br>contaminated soil<br>PM_AB_08.<br>Program for the<br>management of<br>sources of<br>atmospheric<br>emissions.<br>airPM_AB_15.<br>Temporary Facility<br>Management<br>Program   |
|          | Contribution to global<br>warming                    |              | PM_AB_02. Material<br>handling<br>programPM_AB_09.<br>Noise management<br>programPM_AB_10.<br>Vibration and<br>structural noise<br>management<br>programPM_AB_15.<br>Temporary Facility<br>Management<br>Program   |
|          | Alteration to soil quality                           |              | <ul> <li>PM_AB_02. Material<br/>handling</li> <li>programPM_AB_07.</li> <li>Liquid fuel spill or<br/>leak management<br/>program</li> <li>PM_AB_12. Used<br/>oil management<br/>program</li> <li>PM_AB_15.</li> <li>Temporary Facility<br/>Management<br/>Program</li> </ul> |
|          | Alteration in sound pressure<br>levels               |              | PM_AB_09. Noise<br>management<br>programPM_AB_10.<br>Vibration and<br>structural noise<br>management<br>programPM_AB_15.<br>Temporary Facility<br>Management<br>Program  |
|          | Alteration in the visual perception of the landscape |              | PM_B_02.<br>Compensation<br>management<br>program for the<br>biotic environment<br>due to landscape  |


| Exercise   | Impact   | Significance | Management<br>programs  |
|--|--|--------------|---|
|  |  |              | damagePM_B_05.<br>Management<br>program for the<br>biotic environment<br>due to affectation of<br>the visual quality of<br>the landscape  |
| Silvicultural management<br>and removal of vegetation<br>cover | Increase in the amount of waste to be disposed of    |              | PM_AB_02. Material<br>handling program<br>PM_AB_03.<br>Conventional solid<br>waste management<br>program<br>PM_AB_04.<br>Hazardous waste<br>comprehensive<br>management plan  |
|  | Alteration to soil quality                           |              | PM_AB_02. Material<br>handling<br>programPM_AB_07.<br>Liquid fuel spill or<br>leak management<br>program<br>PM_AB_12. Used<br>oil management<br>program<br>PM_AB_15.<br>Temporary Facility<br>Management<br>Program                             |
|  | Change in composition and structure of wildlife      |              | PM_B_01. Urban<br>wildlife management<br>program  |
|  | Alteration in the visual perception of the landscape |              | PM_B_02.<br>Compensation<br>management<br>program for the<br>biotic environment<br>due to landscape<br>damagePM_B_05.<br>Management<br>program for the<br>biotic environment<br>due to affectation of<br>the visual quality of<br>the landscape |
|  | Habitat damage                                       |              | PM_B_02.<br>Management<br>program and<br>removal of   |



| Exercise                                     | Impact   | Significance | Management<br>programs  |
|--|--|--------------|---|
|  |  |              | vegetation cover<br>and stripping   |
|  | Affectation of closed species  |              | PM_B_06. Vascular<br>and non-vascular<br>epiphytic species<br>management<br>program   |
|  | Generation and/or activation<br>of erosive processes and<br>soil stability |              | PM_AB_17.<br>Management of<br>geomorphological<br>conditions and<br>erosion control   |
|  | Increase in the amount of waste to be disposed of                          |              | PM_AB_02. Material<br>handling program<br>PM_AB_03.<br>Conventional solid<br>waste management<br>program<br>PM_AB_04.<br>Hazardous waste<br>comprehensive<br>management plan  |
| Trench excavation (manual and/or mechanical) | Alteration to air quality  |              | PM_AB_02. Material<br>handling<br>programPM_AB_06.<br>Environmental<br>liability management<br>program.<br>contaminated soil<br>PM_AB_08.<br>Program for the<br>management of<br>sources of<br>atmospheric<br>emissions.<br>airPM_AB_15.<br>Temporary Facility<br>Management<br>Program |
|  | Contribution to global warming   |              | PM_AB_02. Material<br>handling<br>programPM_AB_09.<br>Noise management<br>programPM_AB_10.<br>Vibration and<br>structural noise<br>management<br>programPM_AB_15.<br>Temporary Facility<br>Management<br>Program  |



| Exercise | Impact   | Significance | Management<br>programs  |
|----------|--|--------------|---|
|          | Alteration to soil quality                           |              | PM_AB_02. Material<br>handling<br>programPM_AB_07.<br>Liquid fuel spill or<br>leak management<br>program<br>PM_AB_12. Used<br>oil management<br>program<br>PM_AB_15.<br>Temporary Facility<br>Management<br>Program                             |
|          | Alteration in sound pressure<br>levels               |              | PM_AB_09. Noise<br>management<br>programPM_AB_10.<br>Vibration and<br>structural noise<br>management<br>programPM_AB_15.<br>Temporary Facility<br>Management<br>Program   |
|          | Change in composition and structure of wildlife      |              | PM_B_01. Urban<br>wildlife management<br>program  |
|          | Alteration in the visual perception of the landscape |              | PM_B_02.<br>Compensation<br>management<br>program for the<br>biotic environment<br>due to landscape<br>damagePM_B_05.<br>Management<br>program for the<br>biotic environment<br>due to affectation of<br>the visual quality of<br>the landscape |
|          | Habitat damage                                       |              | PM_B_02.<br>Management<br>program and<br>removal of<br>vegetation cover<br>and stripping  |
|          | Alteration of<br>geomorphological<br>conditions      |              | PM_AB_17.<br>Management of<br>geomorphological<br>conditions and<br>erosion control<br>PM_AB_12.  |



| Exercise  | Impact   | Significance | Management<br>programs  |
|---|--|--------------|---|
|   |  |              | Vibration and<br>structural noise<br>management<br>program  |
|   | Generation and/or activation<br>of erosive processes and<br>soil stability |              | PM_AB_17.<br>Management of<br>geomorphological<br>conditions and<br>erosion control   |
|   | Increase in the amount of waste to be disposed of                          |              | PM_AB_02. Material<br>handling program<br>PM_AB_03.<br>Conventional solid<br>waste management<br>program<br>PM_AB_04.<br>Hazardous waste<br>comprehensive<br>management plan  |
| Removal of structures,<br>ducts, wiring, accessories<br>and existing equipment                              | Alteration in the visual perception of the landscape                       |              | PM_B_02.<br>Compensation<br>management<br>program for the<br>biotic environment<br>due to landscape<br>damagePM_B_05.<br>Management<br>program for the<br>biotic environment<br>due to affectation of<br>the visual quality of<br>the landscape |
| Transportation and<br>handling of materials,<br>structures, machinery,<br>waste and excavation<br>leftovers | Increase in the amount of waste to be disposed of                          |              | PM_AB_02. Material<br>handling program<br>PM_AB_03.<br>Conventional solid<br>waste management<br>program<br>PM_AB_04.<br>Hazardous waste<br>comprehensive<br>management plan  |
|   | Alteration to air quality  |              | PM_AB_02. Material<br>handling<br>programPM_AB_06.<br>Environmental<br>liability management<br>program.<br>contaminated soil<br>PM_AB_08.<br>Program for the  |



| Exercise  | Impact   | Significance | Management<br>programs   |
|---|--|--------------|--|
|   |  |              | management of<br>sources of<br>atmospheric<br>emissions.<br>airPM_AB_15.<br>Temporary Facility<br>Management<br>Program  |
|   | Contribution to global<br>warming                    |              | PM_AB_02. Material<br>handling<br>programPM_AB_09.<br>Noise management<br>programPM_AB_10.<br>Vibration and<br>structural noise<br>management<br>programPM_AB_15.<br>Temporary Facility<br>Management<br>Program |
|   | Increase in the amount of waste to be disposed of    |              | PM_AB_02. Material<br>handling program<br>PM_AB_03.<br>Conventional solid<br>waste management<br>program<br>PM_AB_04.<br>Hazardous waste<br>comprehensive<br>management plan                                     |
| Installation of pipes and accessories, ducts and wiring | Contribution to global<br>warming                    |              | PM_AB_02. Material<br>handling<br>programPM_AB_09.<br>Noise management<br>programPM_AB_10.<br>Vibration and<br>structural noise<br>management<br>programPM_AB_15.<br>Temporary Facility<br>Management<br>Program |
|   | Alteration in the visual perception of the landscape |              | PM_B_02.<br>Compensation<br>management<br>program for the<br>biotic environment<br>due to landscape<br>damagePM_B_05.<br>Management<br>program for the<br>biotic environment<br>due to affectation of            |



| Exercise  | Impact  | Significance | Management<br>programs   |
|---|---|--------------|--|
|   |   |              | the visual quality of the landscape  |
| Design and performance tests  | Increase in the amount of waste to be disposed of |              | PM_AB_02. Material<br>handling program<br>PM_AB_03.<br>Conventional solid<br>waste management<br>program<br>PM_AB_04.<br>Hazardous waste<br>comprehensive<br>management plan                                     |
| Horizontal Directional<br>Drilling                                    | Increase in the amount of waste to be disposed of |              | PM_AB_02. Material<br>handling program<br>PM_AB_03.<br>Conventional solid<br>waste management<br>program<br>PM_AB_04.<br>Hazardous waste<br>comprehensive<br>management plan                                     |
|   | Damage to the Main<br>Ecological Structure        |              | WFP_AB_14. Area<br>management<br>program of the Main<br>Ecological Structure   |
| Conformation of base  | Increase in the amount of waste to be disposed of |              | PM_AB_02. Material<br>handling program<br>PM_AB_03.<br>Conventional solid<br>waste management<br>program<br>PM_AB_04.<br>Hazardous waste<br>comprehensive<br>management plan                                     |
| conformation of base,<br>subbase, finished platforms<br>and pavements | Contribution to global<br>warming                 |              | PM_AB_02. Material<br>handling<br>programPM_AB_09.<br>Noise management<br>programPM_AB_10.<br>Vibration and<br>structural noise<br>management<br>programPM_AB_15.<br>Temporary Facility<br>Management<br>Program |
|   | Increase in the amount of waste to be disposed of |              | PM_AB_02. Material handling program  |



| Exercise   | Impact   | Significance | Management<br>programs  |
|--|--|--------------|---|
|  |  |              | PM_AB_03.<br>Conventional solid<br>waste management<br>program<br>PM_AB_04.<br>Hazardous waste<br>comprehensive<br>management plan  |
| Removal of structures,<br>ducts, wiring, accessories<br>and existing equipment | Alteration in the visual perception of the landscape |              | PM_B_02.<br>Compensation<br>management<br>program for the<br>biotic environment<br>due to landscape<br>damagePM_B_05.<br>Management<br>program for the<br>biotic environment<br>due to affectation of<br>the visual quality of<br>the landscape |

Source: Metro Bogotá L1 Environmental Consortium

# 7.6 ENVIRONMENTAL MANAGEMENT PROGRAMS

The objective of the environmental management programs to be implemented during the execution of the relocation, protection, relocation and/or management of networks is to define and establish the management processes and measures for control, prevention, mitigation, compensation and correction of the impacts and risks identified in each project activity.

According to the results obtained in the evaluation of impacts and even more in the ranking of these, we can specify that the highest rating obtained corresponds to Moderate importance. Most of the impacts of the activities corresponding to the transfer of aqueduct networks are of moderate importance (13 impacts of Moderate importance and 6 of Irrelevant importance), as are the activities for the transfer of sewage networks (12 impacts of Moderate importance and 6 of Irrelevant importance), as for the activities for the transfer of the activities of the activities of Moderate importance and 6 of Irrelevant importance), as for the activities for the transfer of dry networks and gas networks, impacts of Moderate and Irrelevant importance are observed equally. In view of the above, environmental management measures will be aimed at the prevention, mitigation and control of negative impacts; in the programs that allow it, specifics will be mentioned according to the activities that have a moderate impact.

It should be noted that the guidelines established in the Inter-American Development Bank's Environmental and Safeguards Compliance Policy (OP-703), the World Bank's Pest Management Policy (OP 4.09), the European Investment Bank's Pollution Prevention and Abatement Policy, the European Investment Bank's Biodiversity and Ecosystems Policy, and the European Investment Bank's Climate Change Standards are used as a fundamental basis for the development of the environmental management program.



#### The Environmental Management Programs are listed below:

| Middle  | Environmental Management Program  | File     | Allocated Budget<br>(COP) |
|---------|---|----------|---------------------------|
|         | Environmental and social compliance program   | PM_GA_01 | 3.200.000,00              |
|         | Supervision and follow-up program for Public Utilities Companies (ESP)                                  | PM_GA_02 | 3.000.000,00              |
|         | Demolition and excavation leftover materials handling<br>and disposal program                           | PM_AB_01 | 1.092.000.000             |
|         | Material handling program   | PM_AB_02 | 1.201.100.000             |
|         | Conventional solid waste management program.  | PM_AB_03 | 221.600.000,00            |
|         | Integrated hazardous waste management plan  | PM_AB_04 | 123.750.000,00            |
|         | Liquid fuels spill or leakage management program  | PM_AB_05 | 16.650.000,00             |
|         | Used oil management program   | PM_AB_06 | 21.530.000,00             |
|         | Discharge management program  | PM_AB_07 | 1.683.000.000,00          |
| ABIOTIC | Environmental liabilities management program: contaminated soils  | PM_AB_08 | 247.780.000,00            |
|         | Atmospheric emissions source management program: air  | PM_AB_09 | 2.674.400.524,00          |
|         | Greenhouse Gas Management Program   | PM_AB_10 | 3.000.000,00              |
|         | Noise management program  | PM_AB_11 | 154.000.000,00            |
|         | Vibration and structural noise management program   | PM_AB_12 | 3.000.000,00              |
|         | Program for the management of water courses, sinkholes and surface water bodies                         | PM_AB_13 | 153.880.000,00            |
|         | Management program for the areas of the Main<br>Ecological Structure                                    | PM_AB_14 | 28.000.000,00             |
|         | Temporary facilities management program   | PM_AB_15 | 223.041.360,00            |
|         | Management for efficient water use  | PM_AB_16 | 82.700.000,00             |
|         | Geomorphologic condition management and erosion<br>control program                                      | PM_AB_17 | 3.000.000,00              |
|         | Urban wildlife management program   | PM_B_01  | 1.500.000,00              |
|         | Compensation management program for the biotic<br>environment landscape impact                          | PM_B_02  | 219.500.000,00            |
| BIOTIC  | Vegetative cover management and removal program and clearing of vegetation cover and topsoil            | PM_B_03  | 595.650.000,00            |
|         | Silvicultural management program  | PM_B_04  | 248.000.000,00            |
|         | Management program for the biotic environment due to the impact on the visual quality of the landscape. | PM_B_05  | 223.021.070,00            |
|         | Management program for vascular and non-vascular epiphytes  | PM_B_06  | 137.600.000,00            |

#### Table 26 - Environmental Management Plan Programs

Source: Consorcio Ambiental Metro Bogotá L1, 2021

# 7.7 ENVIRONMENTAL FOLLOW-UP AND MONITORING PLAN

For the abiotic and biotic components, a total of twenty-five (25) Monitoring and Follow-up programs were defined, corresponding to the same number of Environmental Management Programs.

#### Table 27 – Abiotic and Biotic Environment Monitoring and Tracking Programs



| Middle  | Environmental Management Program  | Monitoring and Follow-up Plan   |
|---------|---|---|
|         | PM_GA_01. Environmental and social compliance<br>program  | Follow-up to PM_GA_01. Program for<br>compliance with environmental and social<br>obligations                             |
|         | PM_GA_02. Supervision and follow-up program for Public Utilities Companies (ESP)                                      | Follow-up to PM_GA_02. Program for<br>supervision and monitoring of Public Service<br>Companies (ESP).                    |
|         | PM_AB_01. Excavation waste material handling<br>and disposal program  | Follow-up to PM_AB_01. Program for handling and disposal of leftover excavation materials.                                |
|         | PM_AB_02. Material handling program   | Follow-up to PM_AB_02. Materials management<br>program  |
|         | PM_AB_03. Conventional solid waste management program   | Follow-up to PM_AB_03. Conventional solid<br>waste management program   |
|         | PM_AB_04. Integrated hazardous waste management plan  | Follow-up to PM_AB_04. Integral hazardous waste management plan   |
|         | PM_AB_05. Liquid fuels spill or leakage management program  | Follow-up to PM_AB_05. Liquid fuels spill or leakage management program.  |
|         | PM_AB_06. Used oil management program   | Follow-up to PM_AB_06. Used oil management program  |
|         | PM_AB_07. Discharge management program  | Follow-up to PM_AB_07. Dumping management<br>program  |
| ABIOTIC | PM_AB_08. Environmental liabilities management program  | Follow-up to PM_AB_08. Environmental liabilities<br>management program  |
|         | PM_AB_09. Atmospheric emissions source<br>management program: air   | Seguimiento al PM_AB_09. Programa de manejo<br>de fuentes de emisiones atmosféricas: aire                                 |
|         | PM_AB_10. Greenhouse gas program  | Follow-up to PM_AB_10. Greenhouse gas<br>program  |
|         | PM_AB_11. Noise management program  | Follow-up to PM_AB_11. Noise management<br>program  |
|         | PM_AB_12. Vibration and structural noise management program   | Follow-up to PM_AB_12. Vibration and structural<br>noise management program   |
|         | PM_AB_13. Program for the management of water courses, drains and surface water bodies.                               | Follow-up to PM_AB_13. Program for the<br>management of water courses, drains, and<br>surface water bodies.               |
|         | PM_AB_14. Management program for areas of<br>Major Ecological Structure   | Follow-up to PM_AB_14. Main Ecological<br>Structure areas management program.   |
|         | PM_AB_15. Temporary facilities management program   | Follow-up to PM_AB_15. Temporary facilities management program  |
|         | PM_AB_16 Management for efficient water use   | Follow-up to PM_AB_16 Management for the efficient use of water   |
|         | PM_AB_17 Geomorphologic condition management<br>and erosion control program   | Follow-up to PM_AB_17 Geomorphologic<br>conditions management and erosion control<br>program                              |
|         | PM_B_01. Urban terrestrial wildlife management<br>(avifauna) program  | Follow-up to PM_B_01. Urban terrestrial wildlife (avifauna) management program.   |
|         | PM_B_02 Compensation management program for the biotic environment landscape impact                                   | Follow-up to PM_B_02 Compensation<br>management program for the biotic environment<br>landscape impact                    |
| BIOTIC  | PM_B_03. Vegetative cover management and removal program and clearing of vegetation cover and topsoil                 | Follow-up to PM_B_03. Program for vegetation management and removal and clearing of vegetation cover.                     |
|         | PM_B_04. Silvicultural management program   | Follow-up to PM_B_04. Silvicultural management program  |
|         | PM_B_05 Management program for the biotic<br>environment due to the impact on the visual quality<br>of the landscape. | Follow-up to PM_B_05Management program for<br>the biotic environment for affecting the visual<br>quality of the landscape |
|         | PM_B_06 Management program for vascular and non-vascular epiphytes  | Follow-up to PM_B_06 Vascular and non-<br>vascular epiphyte management program  |

Source: Consorcio Ambiental Metro Bogotá L1, 2021



Checklists will be developed for the collection of information in the Evaluation, Follow-up and Monitoring Format for each of the abiotic and biotic component programs. Anexo L1T1-CON-AMB-PN-0013\_A12/12\_8.

# 7.8 OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEM

As part of the obligations for the start of the PLMB's Network Relocation, Protection, Relocation and/or Management activities, the provisions of Technical Appendix No. 15 are complied with.

The company METRO LINEA 1, in compliance with the provisions of Law 1562 of 2012, Decree 1072 of 2015 and Resolution 0312 of 2019 and other applicable regulations in force on occupational safety and health; Metro Line 1 - ML1, has structured the OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEM, whose main objective is to control the hazards and risks present in the project, promote continuous improvement and prevent hazardous conditions that may affect the welfare of workers and productivity, with the commitment and responsibility of the senior management of the company METRO LINEA 1, extending the application and compliance to contractors, subcontractors, suppliers, visitors and third parties. (L1T1-CON-AMB-PN-0013\_A14).

The operation of the Management System is proposed through a method defined by stages whose principles are based on the PHVA cycle (Plan, Do, Check and Act) and which includes the following elements; policies, organization, planning, implementation, evaluation, audit and improvement actions, the development of these elements will allow to comply with the purposes of the OSHMS.

The OSH Management System contemplates different stages, which are described in the Occupational Health and Safety System Manual ML1-SST-MN-2020-0001 (Version VGG).

In each of the phases (PLAN, DO, VERIFY AND ACT) defined in the Occupational Health and Safety Management System, the components established in the regulations are specified, according to the identification of risks, the different plans, policies, procedures and standards necessary to carry out an adequate OSH management are established, guaranteeing compliance with the objectives, indicators and goals established by the organization in terms of Occupational Health and Safety.

Objectives of the Occupational Health and Safety System

- Promote the integral wellbeing of workers..
- > Determine strategies to eliminate hazards and reduce risks in the development of activities.
- Comply with legal and other requirements applicable to the organization.

# 7.8.1 Annual occupational health and safety work plan

In compliance with Colombian occupational health and safety legislation, an annual work plan is defined with priority risks.

The annual plan establishes goals, responsibilities, resources, and a schedule of activities, in accordance with the minimum standards of the mandatory quality assurance system of the General Occupational Risk System; it is aligned with the Occupational Safety and Health policy, the matrix for



identifying hazards and risks, and the respective measurement of compliance, coverage, and effectiveness indicators.

On a monthly basis, a report will be made with the necessary supports on compliance with the plan, verifying compliance with the indicators and goals, generating action and improvement plans in the event of deviations or gaps in compliance with the plan.

# 7.8.2 OSH Plan Relocation, Protection and handling of PLMB Networks

The OSH plan identifies the requirements for the execution of the Occupational Health and Safety activities for the PLMB's Relocation, Protection, Relocation and/or Network Management and describes the structure that will be implemented for compliance with legal requirements, contractual requirements, and Multilateral Banking safeguards. (See Annex L1T1-CON-AMB-PN-0013\_A15\_ 15\_1Plan SST).

In order to establish corrective and control actions or measures for the revision of losses that could affect workers, interested parties, equipment and/or the operational continuity of the processes, the matrix for the identification of hazards, risk assessment and determination of controls is established as a result of the application of techniques for the collection of information on occupational risk factors, the intensity of exposure to which the different groups of workers are subjected, as well as the existing controls at the time of the evaluation. The matrix will be reviewed and updated every six months or when new activities, changes in working conditions or a serious accident occur. Forms SIG-PI-FR-04 Hazard Matrix and risk assessment, ML1-SST-FR-2020-022 Safe Work Analysis - ATS, ML1-SST-FR-2020-023 Notification of hazards (commitment to self-care and compliance with OSH standards) are listed in Annex L1T1-CON-AMB-PN-0013\_A15\_15\_1 OSH Plan.

# 7.8.3 Measures for the prevention, promotion, and preservation of health on the occasion of respiratory infections, including those originated by COVID 19

In compliance with the provisions of current legal regulations where the protocol is adopted to mitigate, control and carry out the proper management of respiratory diseases and those associated with the coronavirus COVID-19 to reduce the risk of exposure and contagion by acute respiratory infection caused by these for the workers of the PLMB Transfer, Protection, Relocation and/or Network Management project and their families in the different scenarios in which there is a greater risk of contagion through interpersonal contact, such as: Mobility, entry to the office, to work fronts, work areas, spaces where several people attend, food areas, sanitary units, camps, offices and other areas and/or activities in which proximity between people is required and apply the guidelines there established. The foregoing, in order to reactivate the activities of the previous phase, during the health emergency, promoting measures and actions that guarantee the safety and integrity of all the personnel of the concessionaire, contractors, subcontractors, suppliers and visitors (See Annex 8 - SST Plan Networks-Annex 21 Subfolder Prevention Measures ER).

## 7.9 DISASTER RISK MANAGEMENT

The Disaster Risk Management Plan is based on the written structuring of preventive actions, administrative, functional and operational preparation, before, during and after an emergency or



contingency, which allows the construction project of the First Line of the Bogotá Metro PLMB (Preoperational stage, previous phase) to adapt to the conditions in which the activities will be executed and to define within the training plan the organizational knowledge and attitudes necessary to act correctly in the prevention and control of emergencies.

The plan includes a specific risk analysis that considers possible effects of natural, socio-natural, technological, bio-sanitary and unintentional human origin on the exposed infrastructure and those arising from damage in its area of influence and possible effects of the project. It defines the levels of risk adversity, the identification of risks, the qualification of the threat by vulnerability and its prioritization, the identification of hypothetical scenarios, the presentation of risk tables, the definition of impact criteria against impact relevance (L1T1-CON-AMB-PN-0013\_A16).



# 8 DEVELOPMENT OF THE SOCIOECONOMIC ENVIRONMENT

With respect to the description and characterization of the area of direct influence of the AID, reference was made to the field work carried out through various exploration and social research techniques described in the methodology, the purpose of which was to recognize the social, political, economic and cultural dynamics of the AID, which was defined based on the blocks adjacent to the work corridor.

# 8.1 CHARACTERIZATION

## 8.1.1 Demographic Dimension

It is estimated that the total number of identified blocks is 790 and the total resident population identified for the AID was 128,241 people, which are located in the blocks adjacent to the corridor, it's mean, the population located on both sides of the route.

Of the total resident population, section 1 accounts for 4%; section 2 for 34%; section 3 for 13%; section 4 for 13%; section 5 for 16%; and section 6 for 18%. The section with the largest residential population is located in the district of Kennedy, which is the one with the highest population incidence in the AID; it also has a non-resident population dynamic around commercial activities and institutional and community services.

With the support of the commercial registry of the Bogota Chamber of Commerce, 310,968 people engaged in commercial activities were identified. For the education sector, a population of 120,926 students is estimated throughout the six sections, information that was taken directly from field work (see chapter Spatial Dimension).

## 8.1.2 Spatial Dimension

According to the 2017 Multipurpose Survey, for approximately 15 years the public services of aqueduct, sewerage, garbage collection and electric power have had a coverage close to 100%, information that was corroborated through primary and secondary sources.

With respect to social services, both public and private health institutions have been identified in the AID. Sections 2, 4, 5 and 6 have a concentration of IPS, EPS, hospitals and clinics and specialized health institutions, occupational health IPS and administrative health offices.

There are also 92 educational institutions along the route (which are shown in the section-by-section description of this sector), corresponding to: ICBF social kindergartens, kindergartens of the District Secretary of Social Integration, private kindergartens, IED - District Educational Institutions, private educational institutions and child care institutions.

# 8.1.3 Cultural Dimension

For the transfer of NETWORKS, in accordance with the provisions established for the AII and AID, the following BICs are found:

> There are 4,328 immovable properties of cultural interest of district character in the AII, of which



551 are located within the AID.

- There are 47 immovable properties of cultural interest of national character in the AII, of which 12 are located within the AID.
- ▶ There are 336 properties of movable cultural interest in the IIA, of which 265 are within the AID.
- ▶ There are 22 Sectors of Cultural Interest in the IIA, of which 17 intersect with the AID.
- The perimeter of the Zone of Influence of the PEMP Historic Center overlaps with the AII, in this area there are 573 assets of cultural interest of district character, 27 of national character and 80 movable.
- The perimeter of the Affected Area of the Historic Downtown PEMP overlaps with the AII, in this area there are 1399 properties of cultural interest of district character, 54 of national character and 148 movable. It does not coincide with the AID.
- The perimeter of the Zone of Influence of the PEMP Historic Center overlaps with the AID in two sectors, and coincides with the AID in a portion of Section 4 and another portion of Section 5. There are 17 district properties of cultural interest, 6 national properties and 17 movable properties.

Regarding the presence of ethnic communities, the Ministry of the Interior through certificate number 0894 of August 29, 2017, states that the study area does not register the presence of black, Afro-Colombian, Raizal or Palenquero communities.

# 8.1.4 Political-Organizational Dimension

This dimension is made up in the AID, by:

Zonal Committees: At present and in accordance with the developments of the Project, the following Zonal Committees are in operation: The Zonal Participation Committee and the Oversight Committee in Patio-Taller and 72nd Street. These committees were formed in accordance with the schedules for the start of work, twenty (20) days before starting the works. The Zonal Participation Committee meets on average every two (2) months.

Public and private institutions: It was identified that the 6 sections have a population that is part of the stakeholders of the project and that in turn are participatory agents that will allow the development of the project, as well as become instances of inter-institutional articulation for the development of actions, since their radius of action is not limited to the blocks within the area of direct influence, but on the contrary, they have an impact at local and district level.

Additionally, in relation to the Structural Social Intervention projects, in the AID, there are some of the projects that respond to the Development Plan (2018-2022) "Pact for Colombia, Pact for Equity" and at the district level the Development Plan "A New Social and Environmental Contract for the Bogota of the 21st century", which within its objectives and strategic direction articulates actions at the institutional level to respond to the ODS. (Secretaría Distrital de Planeación, s.f.).

## 8.1.5 Economic Dimension

Production and Technological Processes



There are a total of 18,636 companies in the DIA registered with the Bogota Chamber of Commerce, of which the largest share is in the category of microenterprises (91%) with a total of 16,935; followed by the category of small companies (7.2%) with 1,351; in third place we find medium-sized companies (1.5%) with a total of 282; and finally there is the category of large companies (0.36%) with a total of 67.

Characterization of the Current Labor Market

Throughout the IDA, the sum total of companies generate 77,727 jobs according to the information reported by the Secretariat of Economic Development, with micro-enterprises generating the most jobs, while small companies generate the least number of jobs.

On the other hand, tranches 5 and 6 are the ones that hire the largest number of people; only the large company registers 10,561 jobs in tranche 5 and 14,755 jobs in tranche 6.

Additionally, it is noteworthy that tranches 1, 2 and 3 generate approximately one job per microenterprise, while in tranches 4, 5 and 6 there are approximately two employees per microenterprise. On the other hand, the 30 large companies in section 5 employ 10,561 people and the 36 companies in section 6 generate 7,010, i.e., large companies hire 22.6% of the total number of people employed along the route.

Economic activities related to tourism and/or recreation, which are developed in the AID

Within the area of direct influence of the project route according to the information issued by the Secretariat of Economic Development (e-mail response 4/11/2021, in response to official letter 987-ML1 -031-2125 of July 22, 2021). In the localities where this economic activity is concentrated are the Chapinero and Teusaquillo localities, at the height of section 6.

Private Production Programs and Projects

Regarding the project, in the Gran Britalia neighborhood and in the cadastral sector of Provivienda Oriental in the Kennedy district, a concentration of food and clothing companies was identified, while in the Puente Aranda district no agglomerations were identified.

In the district of Antonio Nariño, no agglomerations were identified in the blocks adjacent to the project; however, between the La Fragua and La Fraguita neighborhoods is the sector known as El Restrepo, which specializes in the concentration of tanning, retanning and garment manufacturing companies, commerce, vehicle maintenance and repair, and food and beverage activities.

The locality of Los Mártires has a high concentration of printing activities, commerce, maintenance and repair of vehicles, wholesale and commissioned or contracted commerce, retail commerce, food and beverage service activities. All activities are present in the neighborhoods of La Capuchina, San Victorino, Voto Nacional and Santa Inés in the Santa Fe district. Thus, it is the largest and most varied commercial area in the whole area, whose food sector is considered the most vulnerable to economic crises.

The Quesada neighborhood in the Teusaquillo district specializes in food and beverage activities, retail trade and, to a lesser extent, financial services, legal and accounting activities and pension services.

In the Lago Gaitán and Quinta Camacho neighborhoods of the Chapinero district, there is a concentration of retail trade activities, food and beverage service activities, development of computer systems, auxiliary financial service activities, real estate activities, legal and accounting activities, business administration activities, architectural and engineering activities, advertising and market research, administrative and office support activities, and human health activities.

Finally, the Barrios Unidos locality has no concentration of commercial activities along the route.

# 8.2 IDENTIFICATION, ANALYSIS AND EVALUATION OF SOCIAL IMPACTS

From the identification and analysis of social impacts it can be established that:

- A total of 15 impacts were identified, of which, 10 are moderate and 4 severe and 1 irrelevant.
- Likewise, 3 risks associated with health and safety issues were identified with a moderate rating.
- The development of the works takes place on arterial and local roads, which directly affects pedestrian and vehicular mobility, increasing travel times on these roads.
- Sections 2 to 6 are mostly located in commercial establishments, informal vendors and agglomerations of the commercial sector, which makes them susceptible to changes in income due to the time and development of construction activities in each of the sections.
- The 10 impacts whose rating is moderate are manageable with the assertive implementation of management measures in accordance with the particularities presented in each of the sections.
- None of the impacts were rated as critical, this is because the sum of the criteria is not greater than 75.
- Two of the impacts with moderate ratings are of a positive nature, which is due to the fact that they will develop and potentiate the strengths identified in the community of the sections to be intervened.
- Eight impacts with moderate ratings are of a negative nature; therefore, with the development and implementation of management measures and programs, the magnitude of the impact can be mitigated or minimized.

## 8.3 SOCIAL MANAGEMENT PROGRAMS

Once the socioeconomic impact assessment was completed, the Social Management Plan was prepared, which, as illustrated in this document, follows the guidelines established in the Environment and Safeguards Compliance Policy (OP-703) of the "Gender Equality in Development Policy (OP-761)" and the Access to Information Policy (OP-102) of the Inter-American Development Bank (IDB). It also includes the safeguard policies "Physical and Cultural Resources (OP 4.11)" of the World Bank and the policies "Cultural Heritage", "Rights and Interests of Vulnerable Groups" and "Labor Standards" of the European Investment Bank-EIB.

Based on the evaluation of the impacts identified for the implementation of the network relocation activities, the Social Management Programs and the estimated budget for each one are listed below:



| Social Management Program   | File <b>a</b>  | Allocated Budget<br>(COP) |
|---|----------------|---------------------------|
| Name: Public information and communication program  | Code: PM_SE_01 | 116.890.922               |
| Name: Metro Listens, Metro Solves Program   | Code: PM_SE_02 | 135.900                   |
| Name: Citizen Participation Program   | Code: PM_SE_03 | 2.941.800                 |
| Name: Citizen empowerment program for the construction of the urban life of the first metro line                            | Code: PM_SE_04 | 747.800                   |
| Name: Interinstitutional articulation program for the construction of the urban life of the First Line of the Bogota Subway | Code: PM_SE_05 | 1.099.000                 |
| Name: Sustainable mobility culture program  | Code: PM_SE_06 | 1.027.620                 |
| Name: "Metro Buen Vecino" (Metro Good Neighbor)<br>infrastructure protection program for third-party assets"                | Code: PM_SE_07 | 33.415.320                |
| Name: Social and labor inclusion program  | Code: PM_SE_08 | 5.040,000                 |
| Name: Management program for the economic sustainability of formal trade  | Code: PM_SE_09 | 1.870.000                 |
| Name: Management program for the occupation of public spaces  | Code: PM_SE_10 | 0                         |
| Name: Program for the construction of the urban fabric of the<br>First Line of Metro de Bogotá                              | Code: PM_SE_11 | 5.040.000                 |
| Name: Management Program for the Protection of the Cultural Heritage  | Code: PM_SE_12 | 0                         |
| Name: Resettlement program  | Code: PM_SE_13 | 0                         |
| Name: Traffic management program  | Code: PM_SE_14 | 4.200.000                 |
| Name: Labor Influence Management Program  | Code: PM_SE_15 | 216.165.467               |

#### Table 28 – Social management programs and budgets

Source: Consorcio Ambiental Metro Bogotá L1, 2021



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