BOSTON METAL DO BRASIL

Coronel Xavier Chaves – MG

Impacts on Air Quality – Atmospheric Dispersion Study (EDA)

Operation Phase

CONTRACT 1BOME002 – OS04- P01 – VF22052025-1647- APRIL/25

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Summary

Insertion index

1 INTRODUCTION

This document presents the Atmospheric Dispersion Study (EDA) of the company Boston Metal do Brasil, considering the future scenario of maximum operational capacity, with the project operating in its entirety (100% of the projected production).

The (EDA) aims to provide, from the production data, representative meteorological and also topographic conditions, the immissions in the receivers (places with the presence of people), taking into account exclusively the inventoried sources of the enterprise.

To carry out the inventory of the emissions of an enterprise, it is necessary to consider all sources of emissions, justifying those that are not significant. To calculate the diffuse sources, emission factors recommended by USEPA (AP-42 methodology, *Compilation of Air Pollutant Emission Factors*), FEAM and NPI (National Pollutant Inventory) of the Australian Government will be used.

At the end of the study, the work should provide important indicators of air quality that will serve as a basis for knowing the air quality in the region, helping in the correct decision-making, either in a preventive or corrective way, if necessary.

1.1 Summary of the project

Boston Metal do Brasil is located under the geographic coordinates (in UTM) of longitude 582260.96 m east and latitude 7672459.75 m south - Zone: 23 K. In the following insert we can see the location of the project.

INSERTION 1-1 - Location of Boston Metal do Brasil

LEGENDA

Área Diretamente Afetada - ADA

LOCALIZAÇÃO

Cliente:	BOSTON ELECTROMETALLURGICAL CORPORATION BRASIL LTDA
Projeto:	ESTUDO DE DISPERSÃO ATMOSFÉRICA - EDA
Título:	MAPA DE LOCALIZAÇÃO DA ÁREA DE ESTUDO
Execução / Data:	Vinicius Minelli / 16.05.25
Revisão / Data:	Brenda Ribeiro / 16.05.25
Escala Aprox.:	1:5.000
Formato/ Orientação:	A3/ Horizontal
Dados Técnicos:	Projeção UTM - SIRGAS2000 Meridiano Central: -45 WGR
Fontes:	Hidrografia (Igam, 2018); Demais dados fornecidos pelo cliente.
Arquivo:	

The company is still in the pre-operational phase and its entry into operation will occur in three progressive stages. The so-called phase 0 consists of the implementation of a pilot plant, with the objective of testing different materials and making the necessary process adjustments to be used in the industrial phases. The so-called phase 1, in the final stage of completion, consists of the installation of a Submerged Arc Furnace (SAF) for melting and refining slag and tailings, to be fed in liquid state to the first 60kA current industrial cell (MOE Cell).

Phase 2 and the last stage, on the other hand, includes operation at full capacity, with the additional installation of an 18MVA SAF furnace and 4 electrolytic cells of 300kA current each. Therefore, the industrial plant will include a total of 2 SAF furnaces for melting and refining and 5 MOE Cell furnaces for the production of special ferroalloys.

For the purposes of this study, the operational data corresponding to Phase 2 will be considered, representing the scenario of total production expected for the project.

The company uses as raw materials slag from metallurgical processes and waste from metallurgy and mining activities, with the objective of obtaining metal alloys of tin, niobium and tantalum. The adoption of a closed production system is essential to mitigate the atmospheric emission of particulate matter generated during the handling of dry slag, as well as to prevent environmental contamination, ensuring the containment and total control of these particles in accordance with current environmental legislation.

The receipt of the material takes place in a fully closed shed, equipped with gates with an interlocking system, ensuring the containment of fugitive emissions, in addition to the fact that it has a wetting system, keeping the ideal humidity constant. The material is then subjected to impurity purge screening and transported by enclosed belts to an industrial dryer. After drying, the material is sent through a pneumatic conveying system to the storage silos and from there they will go to melting and refining furnaces (SAF), where the tin extraction takes place. Then, the refined slag goes to the electrolytic cells and consequent extraction of tantalum iron and niobium iron.

At the end of the process, the residual slag is solidified into large blocks, being transported in buckets by Bruck trucks to the storage shed, from where it will later be returned to the source of origin of the slag, ensuring traceability and proper disposal of the waste.

The enterprise has a complete infrastructure necessary for the development of its activities. In the final study (EDA), all emissions from the operations of the project in Phase 02 will be considered. The project will operate 24 hours a day, 365 days a year.

1.1.1 Sources of Impact

The sources that can contribute to the emission of air pollutants in the unit are:

- Movement of vehicles on paved roads;
- Emissions of combustion gases from diesel and gasoline-powered engines;
- Punctual Emission – Stacks;

2 METHODOLOGY

To prepare the EDA, the following steps were taken into account:

- Recognition and demarcation of the study area with its respective geographical, topographic and climatological characterization;
- Identification of the Sources of Emission of the project.
- Calculation of the emission rate of each source
- Generation and evaluation of air quality scenarios covering the entire study region, through mathematical modeling of pollutant dispersion;
- Analysis of modeled air quality scenarios, compared to air quality standards.

2.1 Mathematical Model of Dispersion and Software Used

The study of atmospheric dispersion is based on the Gaussian plume equation. This assumes that the dispersion of a pollutant from a continuous source has a normal distribution to the axis of the plume, both in the horizontal and vertical planes (vertical direction z and direction y perpendicular to the wind direction). Therefore, the model uses the following calculation:

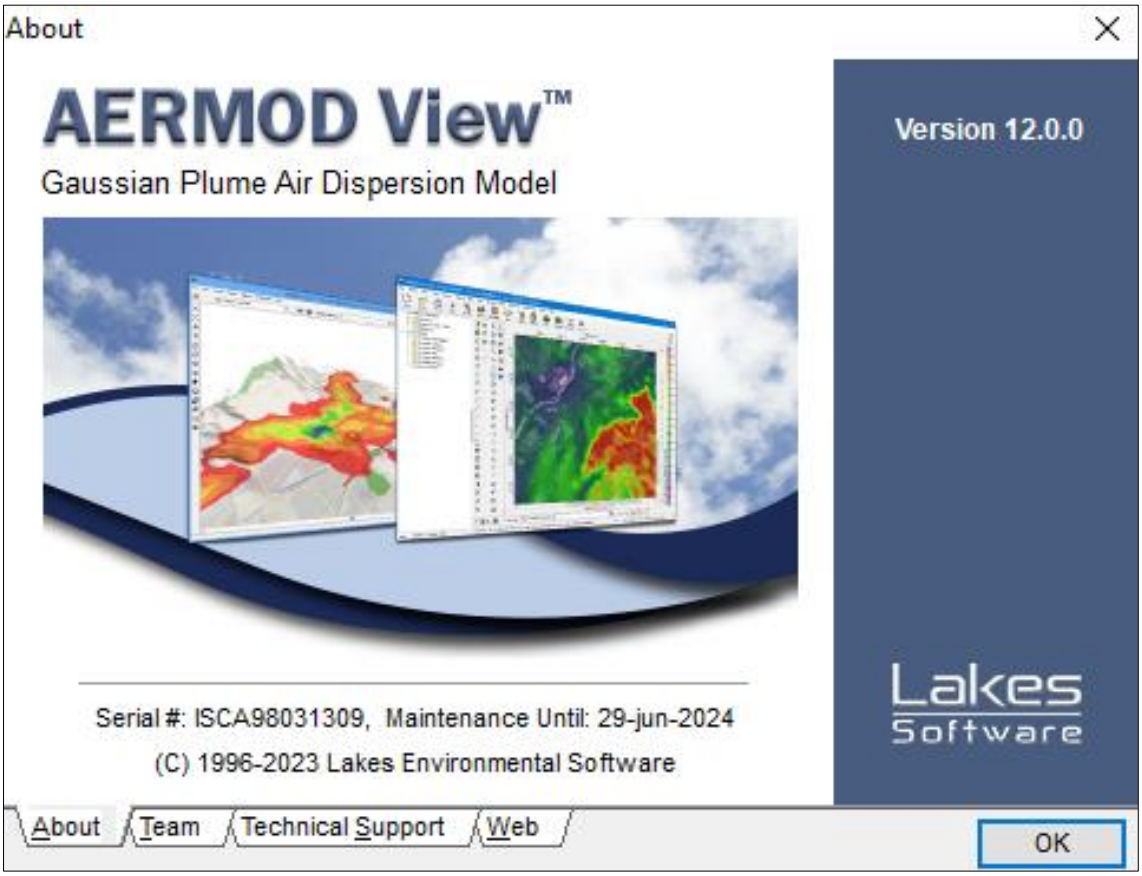
$$C(x,y,z) = \frac{FD}{2\pi} \frac{Q}{u_s \sigma_y \sigma_z} \exp\left[\frac{-y^2}{2\sigma_y^2}\right] \left\{ \exp\left[\frac{-(z-h)^2}{2\sigma_z^2}\right] + \exp\left[\frac{-(z+h)^2}{2\sigma_z^2}\right] \right\}$$

where:

x, y = Cartesian coordinates that identify the analyzed point;
z = average altitude of the cell of the analyzed point, in relation to sea level;
Q = emission rate of the pollutant at the listed source;
us = average wind speed at the time of emission;
σy = distribution parameter in the lateral direction to the axis of the plume;
y = distance orthogonal to the axis of the plume from the analyzed point to the emitting source;
h = effective emission height of the source;
σz = distribution parameter in the vertical direction to the plume axis;
F = correction factor for different sampling times;
D = decay term of the pollutant under consideration.

The *software* used in this EDA corresponds to the *ISCAERMOD-VIEW* Model, latest version 13.0.0, from *Lakes Environmental Software Inc.* The following Insertion presents a certificate of approval from the North American Environmental Protection Agency - EPA.

INSERTION 2-1 - AERMOD-VIEW Software, Version 12.0.0



Source: *Lakes Environmental Software.*

The AMS/EPA *Regulatory Model* (AERMOD) has been specially designed to meet the standards of EPA modeling programs. AERMOD is a program that includes a system with three distinct components: AERMOD (AERMIC *Dispersion Model*), AERMAP (AERMOD Terrain Preprocessor) and AERMET (AERMOD Meteorológica *Preprocessor*).

The AERMOD View version 13.0.0 (summary of the technical specifications below) incorporates the introduction of hourly weather data and dispersion algorithms for complex terrain, whose basic characteristics are as follows:

- It is applicable for both urban and rural areas;
- It is applicable for multiple sources, including point sources, volume sources, and area sources, with adjustment for variations of local terrain topography;
- The dispersion of the plume is done assuming that the dispersion follows the Gaussian distribution, both in the horizontal and vertical directions;
- The concentration in a receptor is the result of the sum of the concentrations caused by all the sources considered in the study;
- The scattering parameters are determined as a function of the Pasquill-Gifford stability classes;
- The coordinate system used to locate the receivers can be polar or Cartesian;
- Uses the main digital terrain elevation formats - USGS DEM, NTF, XYZ files, 1-grade CDED, AutoCAD DXF;
- Interprets the effects of topography, displaying the terrain model in 3D, with visualization built from the interface.

The AERMOD model is also based on the Gaussian plume equation, in steady state, which requires the availability of hourly data. As a product, it estimates the concentration values for each source and receiver combination and calculates the selected averages for short time intervals.

To perform the calculations in the *adopted software* (*AERMOD-VIEW Software*, version 13.0.0) the following input data were required:

1. Characteristics and spatial distribution of emission sources, defined according to the Atmospheric Emissions Inventory;
2. Modeled meteorological data (WRF) for the period from 2021 to 2023, i.e. 3 (three) recent years;
3. Updated planialtimetric data of the study area (contour lines with a distance of 30 m from the SRTM - *Shuttle Radar Topography Mission base*);
4. Definition of the network of receiving points, i.e., points on which calculations and simulations of concentrations of the dispersed pollutant will be carried out.

The outputs offered by the *software* used in the study consisted of the results of the calculations of the atmospheric concentrations of the pollutants: PTS, PM10, PM2.5, NO2, CO and SO2 identifying the iso-concentration curves of the dispersion plumes. These iso-concentration curves were generated and plotted directly on the topographic base and illustrated in a satellite image of the region. This will allow the visualization of the areas potentially affected by the emissions generated by Boston Metal do Brasil.

3 INVENTORY OF EMISSION SOURCES

For the development of atmospheric dispersion modeling, the initial and fundamental step is the elaboration of the inventory of the sources of atmospheric emissions. The sources of emissions of an enterprise can be monitored or not monitored. The monitored sources are those fixed sources, such as stacks, which are sampled by equipment. Unmonitored sources are diffuse sources that can present multiple pollution runaway points.

The atmospheric emissions inventory used production data provided by Boston Metal do Brasil's engineering and ESG team. The entire details of the inventory are available in Annex 1 of this document. To estimate the emissions from diffuse emission sources, the values referenced as emission factors of USEPA AP-42, FEAM and NPI were used and correlated with equations available in the literature.

In order to detail all the calculations carried out, generating transparency in the validation of the interested parties, an electronic spreadsheet was created (Annex 1) in which it relates the production data informed by the entrepreneur with the emission factors available in the literature and all the variables of the production process. In this way, the emission rate of each source was generated so that it could then be inserted into the software.

3.1 Point Sources - Monitored

A point source is the emission of air pollutants from equipment or structures equipped with exhaust and control systems, such as ducts and stacks. With the completion of Phase 2 of the project, it is planned to install nine industrial stacks and a fixed source in the pilot plant.

Emissions from the dryer, electric furnace, MOE electrolytic cell and shot blast will be considered point sources. The main pollutants associated with the handling and transformation of slag are: particulate matter (PM), sulfur dioxide (SO_2), nitrogen oxides (NO_2) and carbon monoxide (CO).

As there is still no real data on emissions from industrial stacks, the estimated values were based on the maximum limits established by the Environmental, Health and Safety Guidelines of the International Finance Corporation (IFC), as presented below.

INSERTION 3-1 – IFC Table – International Finance Corporation – Environmental Guidelines

Table 1. Air Emission Levels for Integrated Steel Mills[c]		
Pollutant	**Units**	**Guideline Value**
Particulate Matter	mg/Nm³	20-50[a]
Oil Mist	mg/Nm³	15
NO_X	mg/Nm³	500 750 (coke oven)
SO_2	mg/Nm³	500
VOC	mg/Nm³	20
PCDD/F	ng TEQ/ Nm³	0.1
Carbon Monoxide (CO)	mg/Nm³	100 (EAF) 300 (coke oven)
Chromium (Cr)	mg/Nm³	4
Cadmium (Cd)	mg/Nm³	0.2
Lead (Pb)	mg/Nm³	2
Nickel (Ni)	mg/Nm³	2
Hydrogen Chloride (HCl)	mg/Nm³	10
Fluoride	mg/Nm³	5
Hydrogen Fluoride (HF)	mg/Nm³	10
H_2S	mg/Nm³	5
Ammonia	mg/Nm³	30
Benzo(a)pirene	mg/Nm³	0.1
Tar fume[b]	mg/Nm³	5

Notes:

[a] Lower value where toxic metals are present

[b] Tar fume measured as organic matter extractable by solvent from total matter collected by membrane filter

[c] Reference conditions for limits. For combustion gases: dry, temperature 273K (0°C), pressure 101.3 kPa (1 atmosphere), oxygen content 3% dry for liquid and gaseous fuels, 6% dry for solid fuels. For non-combustion gases: no correction for water vapor or oxygen content, temperature 273K (0°C), pressure 101.3 kPa (1 atmosphere).

Source: *IFC – International Finance Corporation*

An emission reduction factor compatible with the type of control system adopted was applied. All stacks planned in the project will be equipped with atmospheric emission control systems, as detailed below.

INSERTION 3-2 – Point Source Control System

Stationary sources		Emission Control System
CH1	M2A Stack - PHASE 0	Not Applicable
CH2	DRYING SYSTEM -(308.CHM.0001) (P79)	ICONMAQ Bag Filter
CH3	M.O.E CELL -(308.CHM.0002) (P67)	THERMO-WEB Cartridge Filter
CH4	MELTING AND REFINING FURNACE -(308.CHM.0003) (P68)	THERMO-WEB Cartridge Filter
CH5	MELTING AND REFINING FURNACE (304-FEA-0001)	THERMO-WEB Cartridge Filter
CH6	M.O.E CELL - FeNb (305-CEL-0001)	THERMO-WEB Cartridge Filter
CH7	M.O.E CELL - FeNb (305-CEL-0002)	THERMO-WEB Cartridge Filter
CH8	M.O.E CELL - FeNb (305-CEL-0003)	THERMO-WEB Cartridge Filter
CH9	M.O.E CELL - FeTa (306-CEL-0001)	THERMO-WEB Cartridge Filter
CH10	SHOT BLASTING (309-JTG-0001)	ICONMAQ Bag Filter

Source: Author

The M2A Stack – Phase 0, as it is a stack intended for testing, its emission is considered insignificant compared to industrial stacks, since it has already been subjected to environmental monitoring, whose results indicated reduced emission levels and within acceptable standards, available in Annex 6.

Regarding the mitigation measures that will be implemented in the stacks, two filters stand out, described in detail below.

The THERMO-WEB™ Cartridge is a cartridge filter developed for severe industrial applications such as electric arc furnaces and thermal cutting, offering greater than 99% efficiency in retaining particles above 0.5 µm. Its unique filter media technology ensures high thermal resistance, excellent structural stability and proven performance according to international standards such as ISO 16890 and ASHRAE 52.2 (Annex 4).

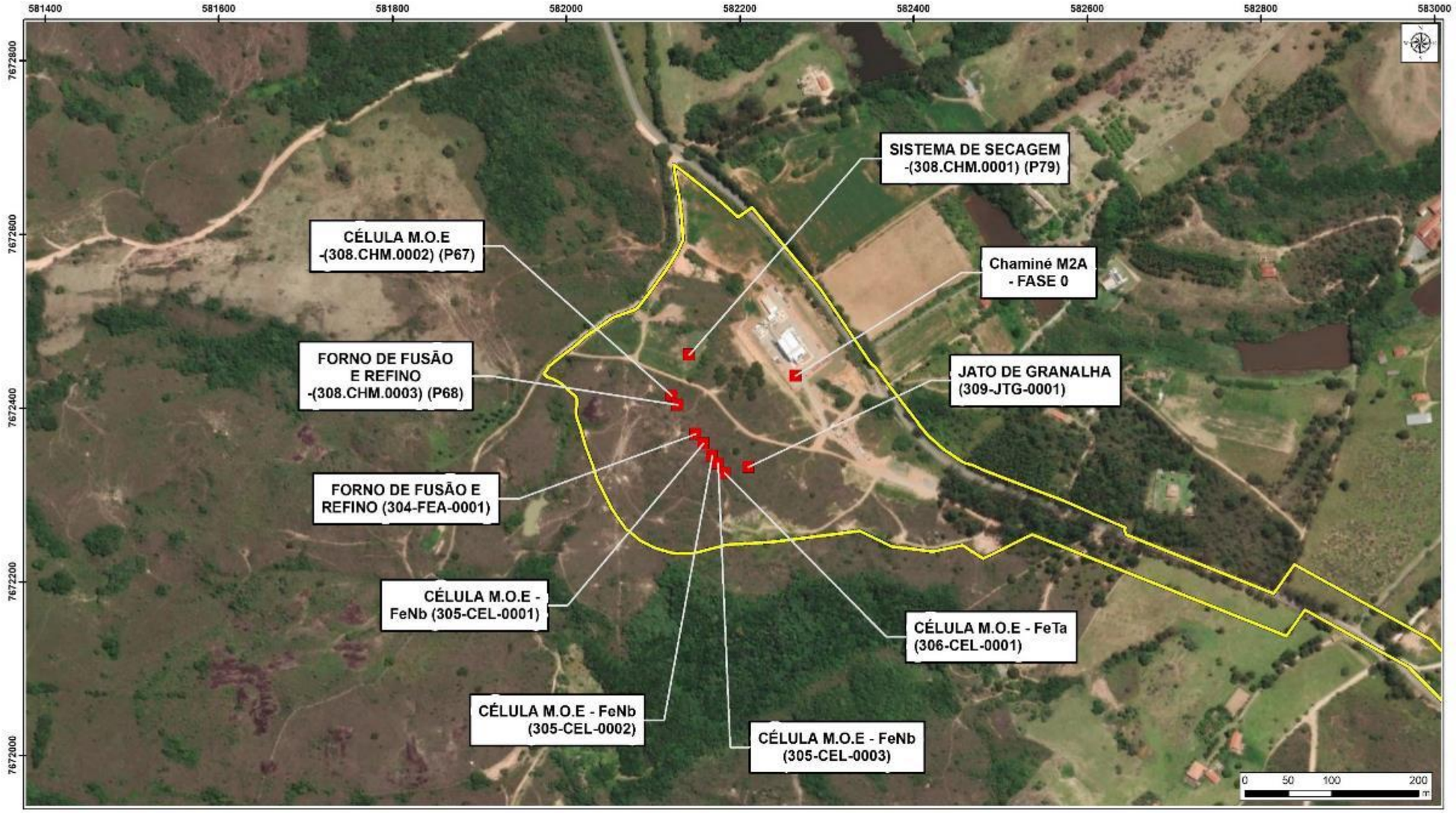
The ICONMAQ bag filter is an environmental control system widely used in industries such as metallurgy, mining, foundries and cement, designed to remove particulate matter present in industrial gases with high efficiency. With an efficiency of over 99%, including for fine particles (PM2.5), it ensures compliance with strict environmental standards, making it ideal for processes with high dust concentrations (Annex 4).

INSERTION 3-3 – Punctual Source – Monitored

Stationary sources		Geographic coordinates (UTM)		Diameter (m)	Height (m)	Flow velocity (m/s)	Flow Temperature (K)	Stack Area (m^2)	Flow rate (m^3/h)
		Longitude	Latitude						
CH1	M2A Stack - PHASE 0	582264	7672437	0,115	4,3	7,29	302,65	0,0079	174,83
CH2	DRYING SYSTEM -(308.CHM.0001) (P79)	582142	7672461	0,7	20	15	383,15	0,38	20781,64
CH3	M.O.E CELL -(308.CHM.0002) (P67)	582121	7672414	1,2	28	15	408,15	1,13	61072,56
CH4	MELTING AND REFINING FURNACE -(308.CHM.0003) (P68)	582128	7672403	1,2	28	15	408,15	1,13	61072,56
CH5	MELTING AND REFINING FURNACE (304-FEA-0001)	582149	7672370	1,5	28	15	408,15	1,77	95425,88
CH6	M.O.E CELL - FeNb (305-CEL-0001)	582158	7672359	1,5	28	15	408,15	1,77	95425,88
CH7	M.O.E CELL - FeNb (305-CEL-0002)	582168	7672345	1,5	28	15	408,15	1,77	95425,88
CH8	M.O.E CELL - FeNb (305-CEL-0003)	582175	7672336	1,5	28	15	408,15	1,77	95425,88
CH9	M.O.E CELL - FeTa (306-CEL-0001)	582183	7672325	1,5	28	15	408,15	1,77	95425,88
CH10	SHOT BLASTING (309-JTG-0001)	582210	7672332	0,5	8	15	308,15	0,20	10602,88

Source: Author.

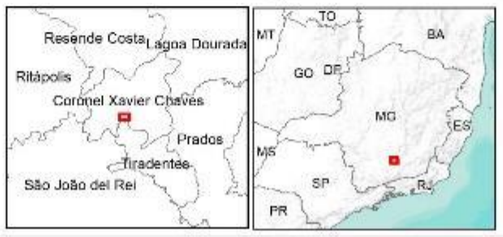
INSERTION 3-4 – Location of Point Sources – Monitored



LEGENDA

- Fontes Pontuais - Chaminés
- Área Diretamente Afetada - ADA

LOCALIZAÇÃO



BRANDT Meio Ambiente

Cliente: BOSTON ELECTROMETALLURGICAL CORPORATION BRASIL LTDA

Projeto: ESTUDO DE DISPERSÃO ATMOSFÉRICA - EDA

Título: MAPA DE LOCALIZAÇÃO DAS FONTES PONTUAIS - CHAMINÉS

Execução / Data	Escala Aprox.:	Formato/ Orientação	Dados Técnicos
Vinicius Minelli / 16.05.25 Revisão / Data: Brenda Ribeiro / 16.05.25	1:4.000	A3/ Horizontal	Projeção UTM - SIRGAS2000 Meridiano Central: -45 WGR

Fontes:
Hidrografia (ganv, 2018)
Demais dados fornecidos pelo cliente

Arquivo:

3.1.1 Stack Emission Compared to National and IFC Emission Standards Applicable to Steel Manufacturing

The estimated emission values for the stacks are presented below, already considering the application of the reduction factors provided by the filters that will be installed. These values are compared to national emission standards, as established in COPAM Resolution No. 187/2013 – Table XVII, and to IFC international standards, according to the World Bank Guidelines on Environmental Health and Safety applicable to steel manufacturing.

INSERTION 3-5 – Stack Emission Compared to National and IFC Standards

Stationary sources	Pollutants	Concentration (mg/Nm³)	Emission Reduction Factor	Reference	Concentration (mg/Nm³)	COPAM 187/13 (mg/Nm³)	IFC - World Bank Guidelines (mg/Nm³)
DRYING SYSTEM -(308.CHM.0001) (P79)	MP	50	99%	Fugitive Dust Control Measures	0,50	150	50
	Sox	500	99%		5,00	1800	500
	Nox	500	99%		5,00	1000	500
	CO	100	99%		1,00	-	100
M.O.E CELL -(308.CHM.0002) (P67)	MP	50	99%	MERV* 14 per ASHRAE 52.2-2007	0,50	150	50
	Sox	500	99%		5,00	1800	500
	Nox	500	99%		5,00	1000	500
	CO	100	99%		1,00	-	100
MELTING AND REFINING FURNACE - (308.CHM.0003) (P68)	MP	50	99%	MERV* 14 per ASHRAE 52.2-2007	0,50	150	50
	Sox	500	99%		5,00	1800	500
	Nox	500	99%		5,00	1000	500
	CO	100	99%		1,00	-	100
MELTING AND REFINING FURNACE (304-FEA-0001)	MP	50	99%	MERV* 14 per ASHRAE 52.2-2007	0,50	150	50
	Sox	500	99%		5,00	1800	500
	Nox	500	99%		5,00	1000	500
	CO	100	99%		1,00	-	100
M.O.E CELL - FeNb (305-CEL-0001)	MP	50	99%	MERV* 14 per ASHRAE 52.2-2007	0,50	150	50
	Sox	500	99%		5,00	1800	500
	Nox	500	99%		5,00	1000	500
	CO	100	99%		1,00	-	100
M.O.E CELL - FeNb (305-CEL-0002)	MP	50	99%	MERV* 14 per ASHRAE 52.2-2007	0,50	150	50
	Sox	500	99%		5,00	1800	500
	Nox	500	99%		5,00	1000	500
	CO	100	99%		1,00	-	100
M.O.E CELL - FeNb (305-CEL-0003)	MP	50	99%	MERV* 14 per ASHRAE 52.2-2007	0,50	150	50
	Sox	500	99%		5,00	1800	500
	Nox	500	99%		5,00	1000	500
	CO	100	99%		1,00	-	100
M.O.E CELL - FeTa (306-CEL-0001)	MP	50	99%	MERV* 14 per ASHRAE 52.2-2007	0,50	150	50
	Sox	500	99%		5,00	1800	500
	Nox	500	99%		5,00	1000	500
	CO	100	99%		1,00	-	100
SHOT BLASTING (309-JTG-0001)	MP	50	99%	Fugitive Dust Control Measures	0,50	150	50
	Sox	500	99%		5,00	1800	500
	Nox	500	99%		5,00	1000	500
	CO	100	99%		1,00	-	100

Source: Author.

3.2 Unmonitored sources

The methodologies used to calculate diffuse emissions will be presented below. All the details of the calculations, development of the formulas and details of the production data are found in Annex 1 of this report.

3.2.1 Paved traffic lanes

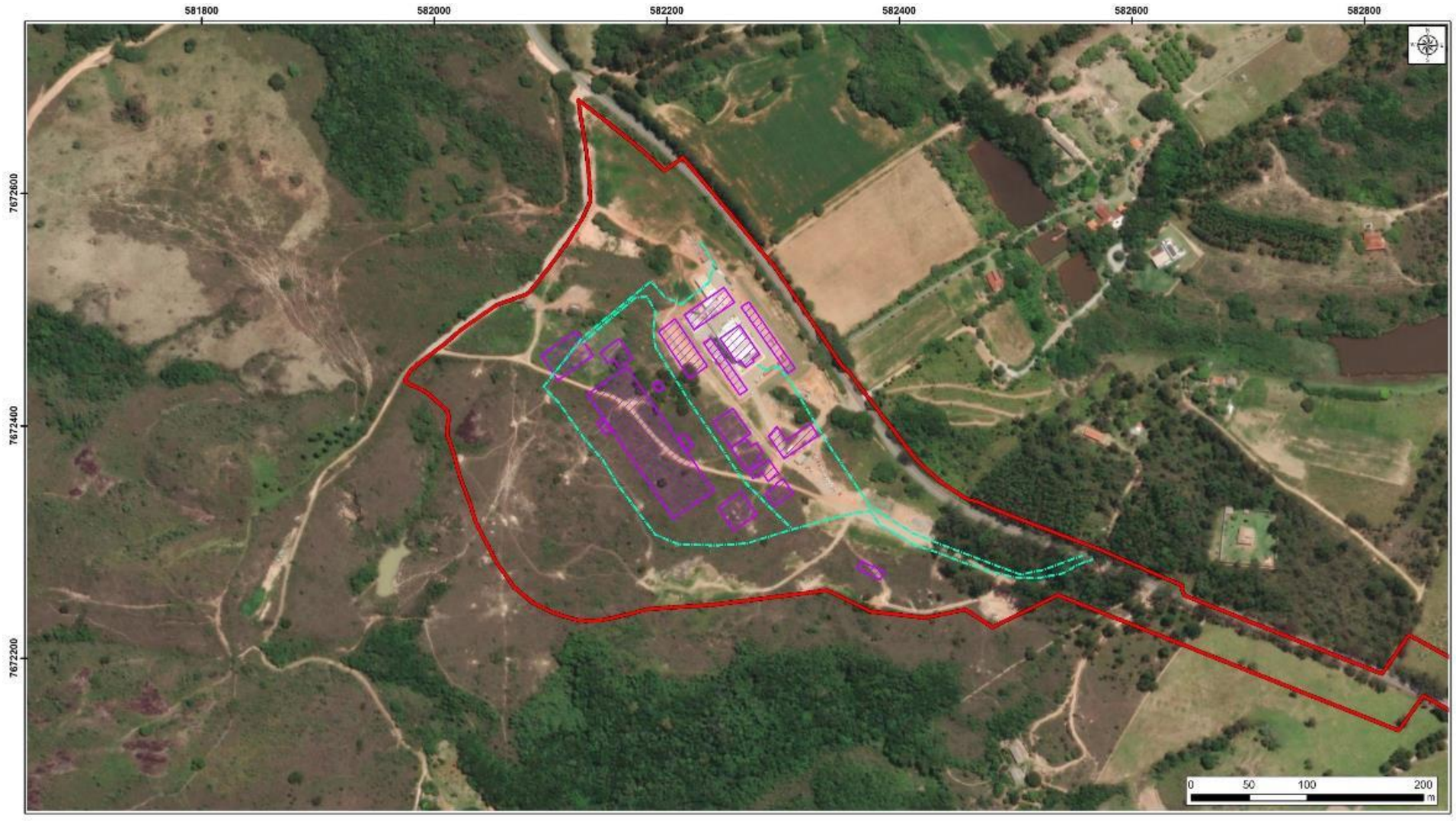
The internal circulation roads of the project will be paved. Thus, emissions from traffic on paved roads were considered, which occur mainly due to the resuspension of particles by the movement of vehicles, as well as direct emissions from exhaust pipes. The following insertion shows the routes considered in the study.(EPA, 2006)

INSERTION 3-6 – Paved Traffic Roads

Denomination	Dimensions	
	Width (m)	Length (km)
Central Way	7,00	0,31
Main Road	7,00	0,80
Via ADM Access	7,00	0,36

Source: Author.

INSERTION 3-7 – Location of Paved Traffic Roads



LEGENDA

- Vias de acesso - Boston
- Edificações
- Área Diretamente Afetada - ADA

LOCALIZAÇÃO

BRANDT Meio Ambiente

Cliente: BOSTON ELECTROMETALLURGICAL CORPORATION BRASIL LTDA

Projeto: ESTUDO DE DISPERSÃO ATMOSFÉRICA - EDA

Título: MAPA DE LOCALIZAÇÃO DAS VIAS DE ACESSO

Execução / Data	Escala Aprox.:	Formato / Orientação	Datum Técnico:
Vinícius Minelli / 16.05.25	1:3.000	A3/ Horizontal	Projeção UTM - SIRGAS2000 Meridiano Central: -45 WGR
Revisão / Data: Brenda Ribeiro / 16.05.25			

Fontes: Ibge (geor, 2010) Demais dados fornecidos pelo cliente.

Arquivo:

To calculate the emissions of particulate matter generated by vehicle traffic on paved roads, the AP-42 - 13.2.1 *Paved Roads methodology was used*. The methodology used to estimate the impact of the vehicles themselves will be detailed in the next topic.

Emission Rate Formula:

$$E = A\ x\ EF\ x\ \left(1 - \frac{ER}{100}\right) x\ FPP$$

Whereas:

E = Emission rate: Calculated from the equation above;

A = Activity rate: Amount acquired from the mileage driven per day;

EF = Emission Factor: Factor calculated from the formula below;

ER = Emission reduction factor: Percentage considered according to the mitigation measure practiced by the project;

FPP = Precipitation factor: Number of "wet" days with at least 0.254 mm of precipitation in the day, acting as natural road mitigation.

$$FPP = \frac{[(365 - P)]}{365}$$

Where:

P = Number of days with at least 0.254 mm of precipitation.

Because we work with a meteorological database of 03 years, in which it totals 1,095 (365 x 3) days, the HGS formula used becomes:

$$FPP = \frac{[(1.095 - P)]}{1.095}$$

Emission Factor Formula:

$$\boldsymbol{E = k\ x\ (sL)^{0,91} x\ (W)^{1,02}}$$

Whereas:

E = Emission factor: Calculated to compose the variable EF of the emission rate equation;
k = Empirical constants: Particle size multipliers to correlate with the correct particle size of the particulate matter.
sL = Track Silt: Fine fragments that are present on track surfaces. In this study, data from the bibliography were used according to the type of enterprise.
W = Average weight of vehicles on the road: The average weight of vehicles interferes with the potential for resuspension of particles on the roads. The empty weight was obtained through the publicly available vehicle sheet. The full weight was obtained from the loading capacity of the same.

3.2.2 Motor vehicles

Vehicle emissions occur through the exhaust pipes of trucks, buses and light vehicles that transit through the project. This emission happens due to the combustion of fuels, whether Diesel or Gasoline. For this, emission factors from studies carried out by the environmental agencies of Minas Gerais (FEAM) were used, as inserted below. The main variables that interfere in the factor used are: type of vehicle and fuel used.

For this study, the vehicle emission factor for the municipality of Juiz de Fora/MG was used, a source with available information and closest to the project and selected due to the lack of an Emission Factor for the municipality of the study area.

INSERTION 3-8 - Emission Factors for Vehicles

feam
FUNDAÇÃO ESTADUAL DO MEIO AMBIENTE

FATORES DE EMISSÃO DA FROTA MUNICIPAL

Juiz de Fora

Fator de Emissão da Frota Licenciada por tipo de combustível

Categoria	Combustível	CO (g/km)	HC (g/km)	NOx (g/km)	SOx (g/km)	MP (g/km)
Automóvel	Gasolina	5,374	0,558	0,476	0,070	0,002
	Etanol	13,976	1,452	1,227	nd	nd
	Diesel	0,433	0,120	1,963	nd	0,054
	Flex (G)	0,272	0,038	0,026	0,070	0,001
	Flex (E)	0,489	0,101	0,052	nd	nd
Caminhão	Diesel	0,741	0,232	4,306	0,130	0,195
Ônibus	Urbano	1,989	0,500	10,218	0,130	0,391
	Microonibus	1,562	0,435	8,059	0,130	0,342
Moto	Gasolina	2,819	0,436	0,125	0,020	nd
	Flex (G)	0,758	0,096	0,074	0,020	nd
	Flex (E)	0,722	0,120	0,052	nd	nd

Categoria	Fator de Emissão da Frota Licenciada por categoria agrupada				
	CO (g/km)	HC (g/km)	NOx (g/km)	SOx (g/km)	MP (g/km)
Automóvel	3,357	0,366	0,355	0,046	0,002
Caminhão	0,741	0,232	4,306	0,130	0,195
Ônibus	1,841	0,478	9,469	0,130	0,374
Moto	2,438	0,375	0,114	0,019	nd

Source: FEAM

Emission Rate Formula:

$$E = A\ x\ EF\ x\ Qv$$

E= Emission rate;
A = Activity (km/day);
EF= Emission factor (FEAM);
Qv= Number of vehicles.

3.2.3 Equipment

Emissions from equipment (such as loaders, generators, compressors, etc.) powered by diesel, gasoline or LPG can be considered in the evaluation of the impact of the project.

However, the project will have a dedicated 138 kV transmission line and substation, ensuring high capacity and reliability in the supply of electricity. Complementing this infrastructure, a redundancy of power supply between the poles of Conselheiro Lafaiete city and São João del-Rei city is already installed, which guarantees an uninterrupted operation, even in contingency situations. This robust solution reinforces the project's energy security and sustains continuous and stable operation.

It should be noted that all the details of calculations are found in Annex 1 of this document. In the following insertion, the equipment considered is observed.

INSERTION 3-9 –Equipment

Equipment / Machinery	Quantity	Fuel Consumption (L/h)	Operating Hours per day (H/day)
WHEEL LOADER	1	28,50	8

Source: Author.

The calculation methods used to determine the emissions of PTS, PM10 and PM2.5, NOx, SO2 and CO that come from internal combustion engines were based on the NPI - National Pollutant Inventory - Emission estimation technique manual for Combustion engines Version 3.0 June 2008.

Emission Rate Formula:

$$E = A\ x\ EF\ x\ \left(1 - \frac{ER}{100}\right)$$

Whereas:

E = Emission rate: Calculated from the equation above;
A = Amount of fuel consumed per day;
EF = Emission factor: Extracted from the bibliographic reference.
ER = Emission Reduction Factor: Not applicable for equipment.

3.3 Disregarded sources

The equipment listed below was discarded because they were all enclosed. The closed production system is essential to avoid atmospheric dispersion of particulate elements resulting from the production process, allowing all particles to be retained and controlled in accordance with current standards.

INSERTION 3-10 – Disregarded sources

Sources	Coordinates		Justification
	x	y	
SLAG WAREHOUSE	582197	7672440	FULLY ENCLOSED SHED WITH AUTOMATIC CLOSING GATE.
VIBRATING GRATE (301.GRE.0001)	582122	7672481	FULLY ENCLOSED AND ENCLOSED
HOPPER (301.MGA.0001)	582122	7672481	FULLY ENCLOSED AND ENCLOSED
PNEUMATIC CONVEYING 302-TRP-0001/0002	582159	7672474	FULLY ENCLOSED AND ENCLOSED
PNEUMATIC CONVEYING 303-TRP-0001/002	582159	7672474	FULLY ENCLOSED AND ENCLOSED
STORAGE SILOS (303-SIL-0001) SCORIA	582159	7672474	FULLY ENCLOSED AND ENCLOSED
STORAGE SILOS (303-SIL-0002) SCORIA	582159	7672474	FULLY ENCLOSED AND ENCLOSED
STORAGE SILOS (303-SIL-0003) SCORIA	582159	7672474	FULLY ENCLOSED AND ENCLOSED
STORAGE SILOS (303-SIL-0004) SCORIA	582159	7672474	FULLY ENCLOSED AND ENCLOSED
STORAGE SILOS (303-SIL-0005) SCORIA	582159	7672474	FULLY ENCLOSED AND ENCLOSED
STORAGE SILOS (303-SIL-0006) SCORIA	582159	7672474	FULLY ENCLOSED AND ENCLOSED
STORAGE SILOS (303-SIL-0007) SCORIA	582159	7672474	FULLY ENCLOSED AND ENCLOSED
STORAGE SILOS (303-SIL-0008) SCORIA	582159	7672474	FULLY ENCLOSED AND ENCLOSED
DOSING FEEDER (303-ALD-0001)	582159	7672474	FULLY ENCLOSED AND ENCLOSED
DOSING FEEDER (303-ALD-0002)	582159	7672474	FULLY ENCLOSED AND ENCLOSED
DOSING FEEDER (303-ALD-0003)	582159	7672474	FULLY ENCLOSED AND ENCLOSED
DOSING FEEDER (303-ALD-0004)	582159	7672474	FULLY ENCLOSED AND ENCLOSED
DOSING FEEDER (303-ALD-0005)	582159	7672474	FULLY ENCLOSED AND ENCLOSED
DOSING FEEDER (303-ALD-0006)	582159	7672474	FULLY ENCLOSED AND ENCLOSED
DOSING FEEDER (303-ALD-0007)	582159	7672474	FULLY ENCLOSED AND ENCLOSED
DOSING FEEDER (303-ALD-0008)	582159	7672474	FULLY ENCLOSED AND ENCLOSED
BELT CONVEYOR (303.TRC.0001)	582159	7672474	FULLY ENCLOSED AND ENCLOSED
PNEUMATIC CONVEYING 302-TRP-0003	582159	7672474	FULLY ENCLOSED AND ENCLOSED
GENERATOR SET	582303	7672372	IT IS NOT INTENDED FOR USE DURING ROUTINE OPERATION.
STORAGE SILOS (204-SIL-0001) MIXING	582163	7672421	FULLY ENCLOSED AND ENCLOSED
STORAGE SILOS (204-SIL-0002) MIXING	582163	7672421	FULLY ENCLOSED AND ENCLOSED
STORAGE SILOS (204-MGA-0001) HEMATITE DOSAGE	582163	7672421	FULLY ENCLOSED AND ENCLOSED
BELT FEEDER (301.ALC.0001)	582122	7672481	FULLY ENCLOSED AND ENCLOSED
BELT CONVEYOR (301.TRC.0001)	582122	7672481	FULLY ENCLOSED AND ENCLOSED
SCREW CONVEYOR (204-TRH-0001@003) MIXING DOSING	582163	7672421	FULLY ENCLOSED AND ENCLOSED

Source: Author

4 SUMMARY OF DIFFUSE AIR EMISSION ESTIMATES

4.1 Summary of the air emissions inventory of diffuse sources

INSERTION 4-1 - Summary of Diffuse Emissions Rates (g/s)

Diffuse sources			PTS	MP10	MP2.5	SO2	NO2	CO
Vehicle Emission + Road Resuspension	VIA1	Central Way	4.35E-03	8.80E-04	2,25E-04	1.45E-05	3.07E-04	5.47E-04
	VIA2	Main Road	2.70E-02	5.51E-03	1.46E-03	1,10E-04	3,18E-03	1.82E-03
	VIA3	Via ADM Access	4.82E-03	9.80E-04	2.54E-04	1.57E-05	4.77E-04	6.63E-04
Point Sources - Stack	CH1	M2A Stack - PHASE 0	< LM	< LM	< LM	< LM	1,11E-03	2.78E-03
	CH2	DRYING SYSTEM -(308.CHM.0001) (P79)	2.89E-03	2.89E-03	2.89E-03	2.89E-02	2.89E-02	5.77E-03
	CH3	M.O.E CELL -(308.CHM.0002) (P67)	8.48E-03	8.48E-03	8.48E-03	8.48E-02	8.48E-02	1.70E-02
	CH4	MELTING AND REFINING FURNACE -(308.CHM.0003) (P68)	8.48E-03	8.48E-03	8.48E-03	8.48E-02	8.48E-02	1.70E-02
	CH5	MELTING AND REFINING FURNACE (304-FEA-0001)	1,33E-02	1,33E-02	1,33E-02	1,33E-01	1,33E-01	2.65E-02
	CH6	M.O.E CELL - FeNb (305-CEL-0001)	1,33E-02	1,33E-02	1,33E-02	1,33E-01	1,33E-01	2.65E-02
	CH7	M.O.E CELL - FeNb (305-CEL-0002)	1,33E-02	1,33E-02	1,33E-02	1,33E-01	1,33E-01	2.65E-02
	CH8	M.O.E CELL - FeNb (305-CEL-0003)	1,33E-02	1,33E-02	1,33E-02	1,33E-01	1,33E-01	2.65E-02
	CH9	M.O.E CELL - FeTa (306-CEL-0001)	1,33E-02	1,33E-02	1,33E-02	1,33E-01	1,33E-01	2.65E-02
	CH10	SHOT BLASTING (309-JTG-0001)	1.47E-03	1.47E-03	1.47E-03	1.47E-02	1.47E-02	1.47E-02
Equipment	EQ1	WHEEL LOADER	7.01E-03	7.01E-03	6.45E-03	4.86E-05	7.66E-02	2.36E-02

Source: Author

< LM: Value below the detection limit (Minimum limit)

5 PREMISES

A well-defined and technically validated weather database is essential to build realistic scenarios. In addition to this, the topographic base is also essential for the correct identification of points of stagnation or channeling of pollutants to a given place. To do so, it used the *Lakes Environmental* database SRTM1/SRTM3. This topographic basis allows the consolidation of an assertive internal digital terrain model in the *software.*

5.1 Weather Data

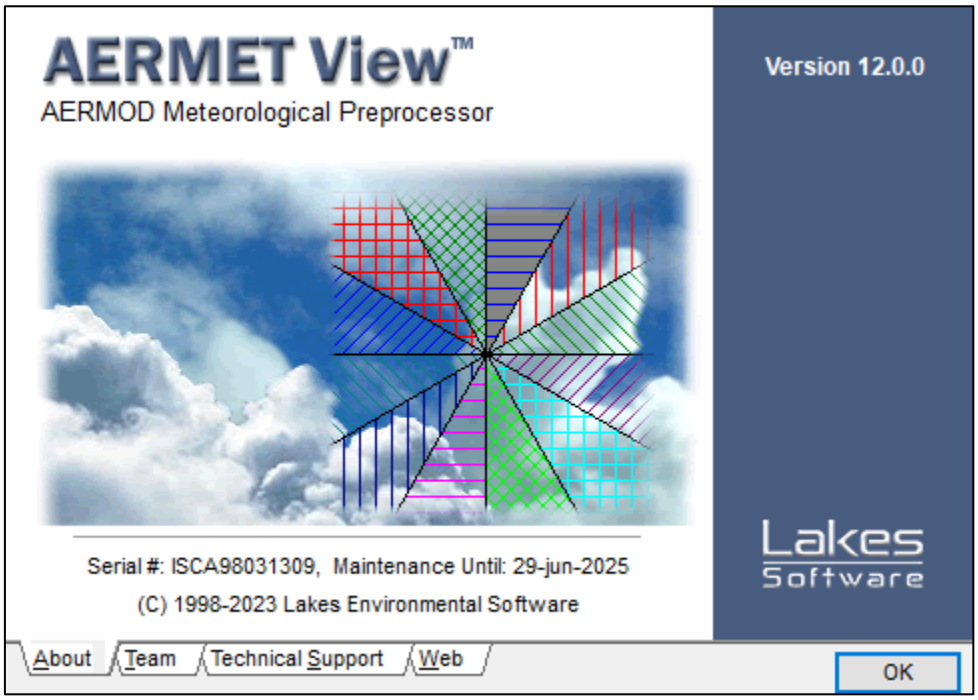
Meteorological data are essential to understand the behavior of the dispersal plume, the predominant direction of the drag, and several other aspects that shape and define the spatial relationship between the source and the receiver. For this study, we opted for the use of WRF (Weather Research and Forecasting Model) modeled data due to the absence of at least 90% of annual data.

For the purpose of comparison and validation of the modeled data, the INMET Meteorological Station located in the municipality of São João Del Rei/MG was considered, at geographic coordinates 21.106505º south latitude and 44.250932º west longitude, located approximately 8 kilometers from the project.

In Annex 03, the meteorological report is presented, in which the modeled data are compared with the information observed at the station

It is noteworthy that the use of a well-characterized and technically validated meteorological database is essential for the construction of realistic scenarios of atmospheric dispersion. For this, the technical validation of a qualified meteorologist was used, ensuring the reliability of the data used in the modeling process.

INSERTION 5-1 - Meteorological Pre-Processing Software (AERMET)

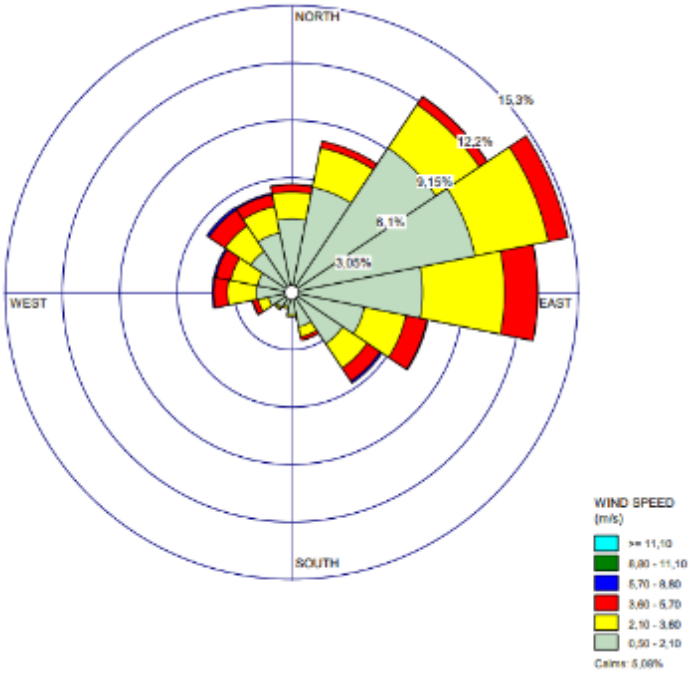


Source: *Lakes Environmental Software.*

Several parameters interfere in atmospheric dispersion, among them, the database used has the following variables: cloud cover, relative humidity, dry bulb temperature, atmospheric pressure, wind direction and speed, rainfall, solar radiation and dew point temperature.

The following insert graphically represents the synthesis of the behavior of the winds based on the meteorological simulation of the indicated point and constitutes an important resource for the interpretation of the dispersion behavior of the pollutant plume, as well as for the analysis of the results, which will be presented below. According to the Compass Rose shown below, the region has prevailing winds that arrive from the east – northeast direction.

INSERTION 5-2 - Compass Rose from WRF Modeling – Development Site



Source: AERMET, 2025.

5.1.1 Albedo, Bowen Ratio and Surface Roughness

It is considered as *Albedo* the fraction of the total incidence of solar radiation reflected by the surface back into space without absorption. *Bowen Ration* It is an indicator of surface moisture, being the ratio of sensible heat flow to latent heat flow. Already *Surface Roughness* influences the surface shear stress. Together, these parameters are used to determine the planetary layer boundary.(EPA, 2020)

In this study, we used available values from the WRF model, as shown in the following image.

INSERTION 5-3 - Albedo Values, Bowen's Ratio and Roughness

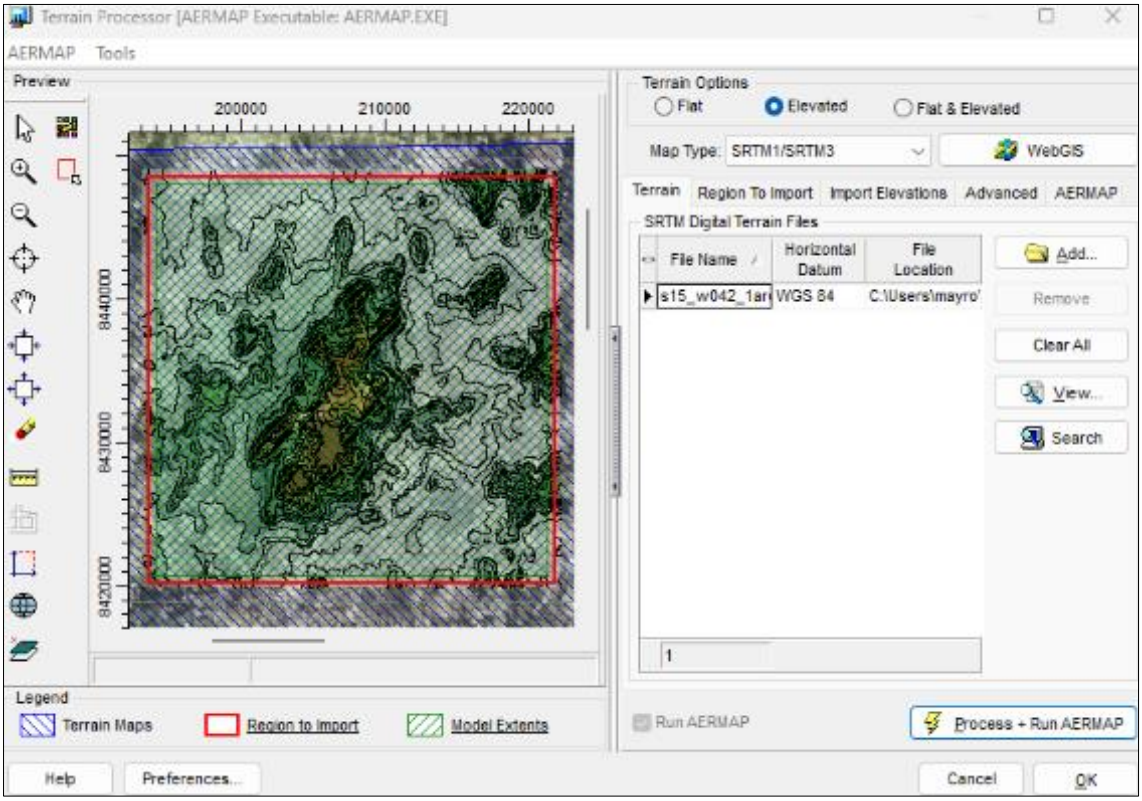
Period	Albedo	Bowen	Roughness (m)
January	0,15	0,25	0,06652
February	0,15	0,27	0,07298
March	0,16	0,34	0,08244
April	0,16	0,47	0,06873
May	0,17	0,56	0,05923
June	0,16	0,58	0,05136
July	0,17	0,72	0,04177
August	0,17	0,96	0,03597
September	0,17	0,98	0,04136
October	0,16	0,83	0,04419
November	0,15	0,44	0,04850
December	0,15	0,33	0,04736
Annual	0,16	0,56	0,05503

Source: Meteorological Opinion Report – Annex 3

5.2 Topographic Base

AERMOD needs to use as input data a topographic base, from which the internal equations of the model allow the evaluation of the influence of the relief and its roughness, among other aspects. Naturally, the greater the detail of the terrain model available, the more assertive the results regarding the dispersal plumes become.

INSERTION 5-4 – Terrain Processor Input Screen - AERMAP



Source: AERMOD / AERMAP output of the Project's topographic model

For the structuring of the Terrain Model used in the modeling in question, contour lines with a distance of 30 m were inserted from a SRTM base of high precision and reliability. The DTM is obtained through the internal cartographic system made available by Lakes (developer of the AERMOD modeling software) through the AERMAP topographic preprocessor, and is later checked and certified by the geoprocessing sector of Brandt Meio Ambiente. Next, the elevation of the terrain of the study area is observed.

INSERTION 5-5 – Land Elevation - AERMAP

LEGENDA

Boston Electrometallurgical

Curvas de nível 30m

Área Diretamente Afetada - ADA

Hipsometria (m)

662 - 894
894 - 951
951 - 987
987 - 1.022
1.022 - 1.065
1.065 - 1.117
1.117 - 1.434

LOCALIZAÇÃO

BRANDT Meio Ambiente

Cliente: BOSTON ELECTROMETALLURGICAL CORPORATION BRASIL LTDA

Projeto: ESTUDO DE DISPERSÃO ATMOSFÉRICA - EDA

Título: MAPA HIPSOMÉTRICO DA ÁREA DE ESTUDO

Execução / Data:	Escala Aprox.:	Formato / Orientação:	Dados Técnicos:
Vinicius Minelli / 21.05.25	1:50.000	A3/ Horizontal	Projeção UTM - SIRGAS2000 Meridiano Central: -45 WGR
Revisão / Data: Brenda Ribeiro / 21.05.25			
Fontes: MDE/Curvas de nível: ALOS PALSAR (2006) Demais dados fornecidos pelo cliente.		Arquivo:	

After processing the topographic data sources for the constitution of the Terrain Model, the rendered curves were obtained with a spacing of 30 meters between them, allowing this format to be supported by AERMOD processors.

In relation to the EDA area and receptors for the pollutants, a Cartesian coordinate system was established, originating from the central point UTM 582260.92 / 7672454.93, spindle 23 K. From this point, a modeling area with approximately 100 km2 (10 km x 10 km) was defined. The receiving points were distributed in two meshes with spacing of 500 m x 500 m and 250 m x 250 m.

5.3 Background Concentration (Ambient Air Quality)

The primary samples of ambient air quality were collected at two different points within the project, covering two seasonal periods: the dry period and the rainy season. For evaluation purposes, data from the dry period were conservatively adopted, considering that this scenario tends to present higher concentrations of pollutants.

According to the air quality reference monitoring, the results indicate that the air quality in the study area was within the acceptable standards by CONAMA 506/2024. It should be noted that there is no continuous air quality monitoring station installed in the Boston area. For this reason, the background concentration obtained in the primary monitoring was converted to different average time periods in order to assess compliance with legal standards, using the following power law relationship (OMOE, 2014):

$$Clong = Cshort\left(\frac{tshort}{tlong}\right)^{p}$$

where:

Clong = the concentration for the longest average time
Cshort = the concentration for the shortest average time
tshort = shortest average time (in minutes)
tlong = longest average time (in minutes)
p = exponent of the power law

For ambient air quality assessments, p = 0.28 is adopted for gaseous pollutants, according to OMOE (2014). In the case of particulate matter (dust), the p-value is 0.5, according to Beychok (2005), allowing the conversion of average concentrations of 24 hours or annually.

This methodology is considered conservative and therefore suitable for estimating background concentrations in this study. To represent the worst-case scenario, the highest value obtained between the two primary air quality monitoring points was considered. The estimated maximum background concentration is shown in the following insert.

In the following insertion, it is observed that the background concentration of $PM_{2,5}$ already exceeds the 24-hour Final Guide Value established by the World Health Organization (WHO).

INSERTION 5-6 – Background Concentrations

Parameters	Time	Concentration (µg/m³)	CONAMA No. 506 of 2024 (µg/m³)		% WHO (2021)(µg/m³)	
			PI-2	Final Guide	MI-1	Final Guide Values
Total Suspended Particles	24 hours	86,90	-	240	-	-
	Annual	4,55	-	80	-	-
Inhalable Particles (PM10)	24 hours	37,45	100	-	150	45
	Annual	1,96	35		70	15
Inhalable Particles (PM2.5)	24 hours	28,53	50	-	75	15
	Annual	1,49	17		35	5
Sulphur Dioxide (SO2)	24 hours	0,77	50	-	125	40
	Annual	0,15	30		-	-
Nitrogen Dioxide (NO2)	24 hours	0,35	-		120	25
	1 Hour	0,86	240	-	-	-
	Annual	0,07	50		40	10
Carbon Monoxide (CO)	24 hours	< LM	-	-	7000	4000
	8 hours	< LM	-	9 ppm = 10310 µg/m³	-	10000

Source: Air Quality Monitoring Report, number 241283 - Annex 5.

< LM = Value below the detection limit (Minimum limit)

5.4 Sensitive Receptors

Receiving bodies are areas with the presence of people, whether in agglomerations, urban centers or even farms. Sensitive receptors, on the other hand, are those in which the group of people inserted in that environment has a greater degree of fragility, such as hospitals, schools, daycare centers and nursing homes. It should be noted that the following should not be considered as recipients: companies, uninhabited areas and points within the enterprise.

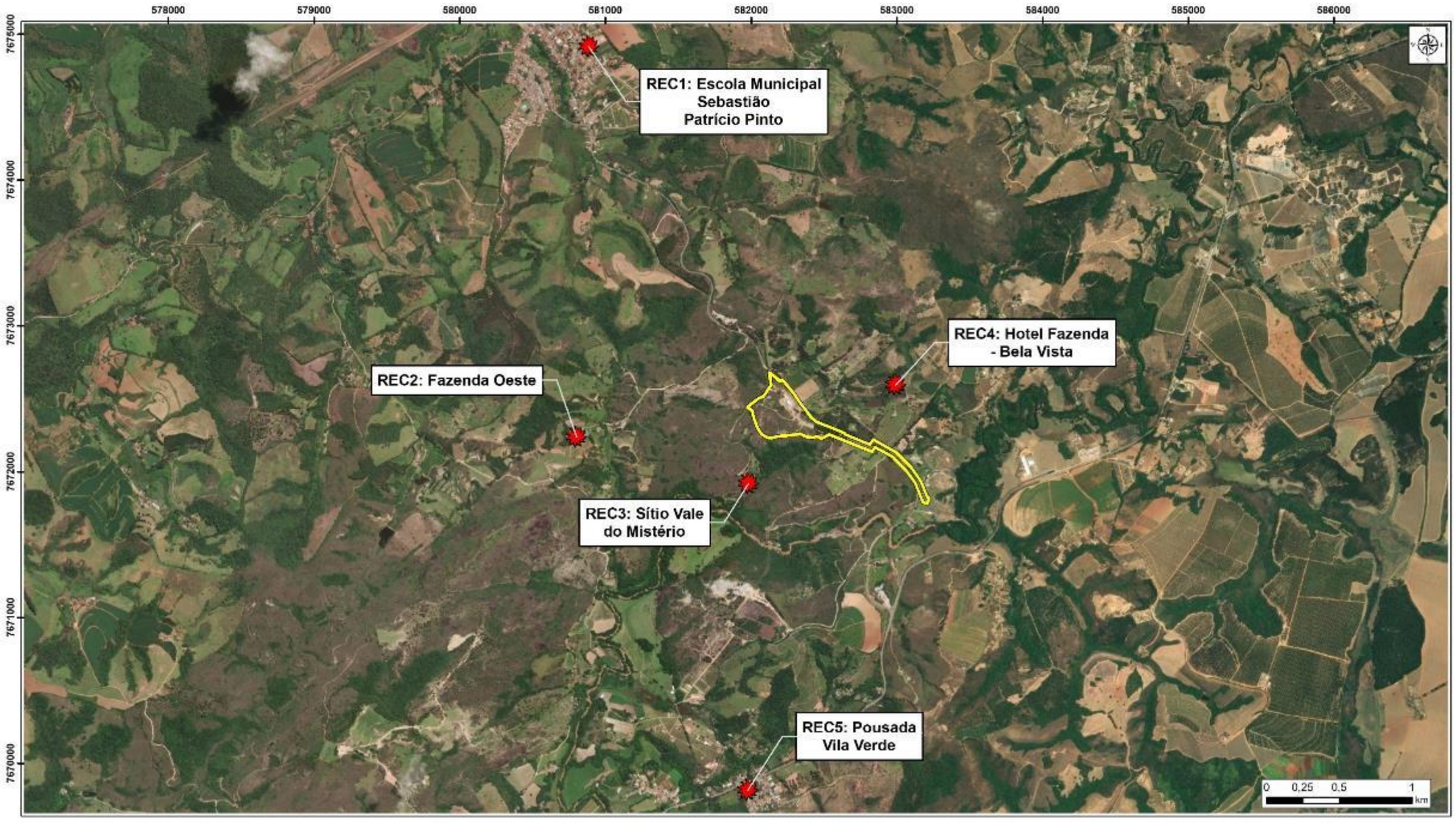
These points are important in dispersion modeling to know specifically the concentrations that reach these locations. For this study, 05 points around the unit were considered as receivers to evaluate concentrations. In the following insert, the geographic coordinates are detailed.

INSERTION 5-7 - Defined Receivers

Receiving Points	Coordinates		Orientation	Company Distance
	[x]	[Y]		[km]
REC1: Sebastião Patrício Pinto Municipal School	580887	7674915	North	2,67
REC2: West Farm	580802	7672236	West	1,23
REC3: Sitio Vale do Mistério	581982	7671917	South	0,73
REC4: Hotel – Bela Vista	582993	7672594	East	0,34
REC5: Pousada Vila Verde	581978	7669814	South	2,46

Source: Author

INSERTION 5-8 - Location of Defined Receptors in Modeling



5.5 Downwash Effect in AERMOD

The downwash effect refers to the influence that nearby buildings or structures exert on air flow and the dispersion of air pollutants from emitting sources, such as stacks. In practical terms, downwash occurs when a plume of pollutants is deflected downward due to obstacles, resulting in high concentrations closer to the ground and shorter distances from the source.

Next, the buildings inserted in the software are presented, whose presence was considered in the modeling to evaluate the effects of downwash on the dispersion of pollutants.

INSERTION 5-9 – Buildings of the Development

LEGENDA

Edificações

Área Diretamente Afetada - ADA

LOCALIZAÇÃO

BRANDT Meio Ambiente

Cliente: BOSTON ELECTROMETALLURGICAL CORPORATION BRASIL LTDA

Projeto: ESTUDO DE DISPERSÃO ATMOSFÉRICA - EDA

Título: MAPA DE LOCALIZAÇÃO DAS EDIFICAÇÕES

Execução / Data:	Escala Aprox.:	Formato / Orientação:	Datum / Sistema:
Vinicius Minelli / 16.05.25	1:3.000	A3/ Horizontal	Projeção UTM - SIRGAS2000 Meridiano Central: -45 WGR
Revisão / Data: Brenda Ribeiro / 16.05.25			

Fontes: Hidrografia (ipam, 2019). Demais dados fornecidos pelo cliente.

Arquivo:

5.6 Air Quality Standards

To control air quality, CONAMA Resolution No. 506/2024 was instituted, which provides for air quality standards. This is a norm of the National Council for the Environment (CONAMA) that establishes values of concentrations of specific atmospheric pollutants in the atmosphere, associated with an interval of exposure time. This Resolution was published on July 5, 2024, thus replacing CONAMA Resolution No. 498/18.

In summary, CONAMA Resolution 506/2024 is an important measure for the protection of the environment and for the promotion of the sustainable use of natural resources in national enterprises.

The table with the regulated air pollutants and their respective air quality standards is presented below.

INSERTION 5-10 - Air Quality Standards - CONAMA Resolution No. 506/2024

Poluente Atmosférico	Periodo de Referência	PI-1	PI-2	PI-3	PI-4	PF	
		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	ppm
Material Particulado - MP10	24 horas	120	100	75	50	45	-
	Anual[1]	40	35	30	20	15	-
Material Particulado - MP2,5	24 horas	60	50	37	25	15	-
	Anual[1]	20	17	15	10	5	-
Dióxido de Enxofre - SO2	24 horas	125	50	40	40	40	-
	Anual[1]	40	30	20	20	20	-
Dióxido de Nitrogênio - NO2	1 hora[2]	260	240	220	200	200	-
	Anual[1]	60	50	45	40	10	-
Ozônio - O3	8 horas [3]	140	130	120	100	100	-
Fumaça	24 horas	120	100	75	50	45	-
	Anual[1]	40	35	30	20	15	-
Monóxido de Carbono - CO	8 horas [3]	-	-	-		-	9
Partículas Totais em Suspensão - PTS	24 horas	-	-	-		240	-
	Anual[4]	-	-	-		80	-
Chumbo - Pb[5]	Anual[1]	-	-	-		0,5	-
1 - média aritmética anual							
2 - máxima média horária obtida no dia							
3 - máxima média móvel obtida no dia							
4 - média geométrica anual							
5 - medido nas partículas totais em suspensão							

Source: CONAMA Resolution No. 506/2024

[1] Annual arithmetic mean
[2] Annual average
[3] Moving average high obtained on the day

It is noteworthy that the PI-1 Standard remained in force until December 31, 2024. On January 1, 2025, the PI-2 Standard came into force, which establishes more restrictive limits for air pollutant emissions. The PI-3 Standard will enter into force on January 1, 2033, followed by the PI-4 Standard, which is scheduled to take effect on January 1, 2044. The evolution of these standards reflects the increase in requirements by regulatory agencies and other stakeholders in the control and improvement of air quality.

The Final Standard, in turn, corresponds to the guide values recommended by the World Health Organization (WHO), and is considered an international reference for the promotion of stricter air quality standards, with a focus on protecting public health and reducing environmental impacts. In this report, the results obtained will also be compared with the limits suggested by the IFC established by the WHO, as presented in the following table.

INSERTION 5-11 - Air Quality Standards – WHO (2021)

Poluente	Período de referência	Meta intermediária				Valores-guia
		1	2	3	4	
$MP_{2,5}$, µg/m³	Anual	35	25	15	10	5
	24 horas[a]	75	50	37,5	25	15
MP_{10}, µg/m³	Anual	70	50	30	20	15
	24 horas[a]	150	100	75	50	45
O_3, µg/m³	Alta temporada[b]	100	70	–	–	60
	8 horas[a]	160	120	–	–	100
NO_2, µg/m³	Anual	40	30	20	–	10
	24 horas[a]	120	50	–	–	25
SO_2, µg/m³	24 horas[a]	125	50	–	–	40
CO, mg/m³	24 horas[a]	7	–	–	–	4

Source: WHO (2021).

6 RESULTS

The results and later the discussions of the modeling of the pollutants will be presented: PTS, PM10, PM2.5, NO2, SO2 and CO from Boston Metal do Brasil.

It is important to highlight that the simulation plumes, in the short-term period, present the worst concentration in a meteorological condition that occurred in the three years modeled. The plumes of annual pollutants (long period) present the averages of the entire modeled period.

It is important to emphasize once again that an atmospheric dispersion study is, elementarily, an estimate, in which mathematical equations are used with some variables (data from emission sources and their projected controls with their respective efficiencies, climatological information for a given period and topographic basis) and, therefore, has its limitations, which must always be considered. Its results should be used with caution and, together with the monitoring of sources and air quality, can contribute to an assessment and interpretation of the potential impacts of an enterprise.

In view of this fact, the results of an EDA should not be used as exact statements in terms of the concentration of pollutants in a given region, even because several other sources, including natural ones, can contribute to the composition of air quality.

The concentrations of all pollutants considered under the following conditions will be presented below: background concentration, maximum concentration estimated by modeling and the total concentration resulting from the sum between the background concentration and the maximum concentration obtained in the modeling.

6.1 Total Suspended Particles - TSP

The particulate matter TSP (Total Suspended Particles) has particles with a diameter of up to 50 micrometers. According to CONAMA resolution No. 506/2024, the maximum concentration limit allowed by the final PF standard is 240 µg.m-3 in a 24-hour period and 80 µg.m^{-3} annually.

The World Health Organization (WHO) does not establish specific air quality standards for STP.

Maximum concentration of the Project only

The air quality assessment by modeling aims to verify compliance with established national standards. Based on the simulations referring exclusively to the project's emissions, the maximum concentration of TSP predicted for the 24-hour period was 11.78 µg/m³, while the estimated annual average was 5.91 µg/m³.

The maximum modeled contribution represents approximately 4.91% of the national limit for 24 hours and 7.38% of the limit for the annual average, as defined in CONAMA Resolution No. 506/2024. Thus, it is verified that the predicted values do not exceed the national air quality standards.

Background Concentration + Maximum Modeling Concentration

For the analysis of the combined scenario, the highest concentration of the bottom recorded, corresponding to the dry period, was considered. The sum of the background concentration with the maximum concentration predicted by the modeling, for the short term (24 hours), resulted in 96.68 µg/m³, which corresponds to 41.12% of the limit established by CONAMA Resolution No. 506/2024. For the long term (annual average), the total estimated concentration was 10.45 µg/m³, equivalent to 13.07% of the national standard.

Thus, it is concluded that, even considering the most conservative scenario, the estimated TSP concentrations remain within the legal limits, both for the 24-hour period and for the annual average, fully meeting the criteria of CONAMA Resolution No. 506/2024.

INSERTION 6-1 – Maximum Concentration – TSP

Scenario	Average Time	Max. Concentration (µg/m3)	Coordinates		CONAMA N°506/2024	% CONAMA N°506/2024
			x	y		
Background Concentration	24 hours	86,9	582368	7672359	240	36,21%
	Annual	4,55	582368	7672359	80	5,69%
Concentration Worst Case for the Company	24 hours	11,78	582232	7672559	240	4,91%
	Annual	5,91	582232	7672309	80	7,38%
Background Concentration + Worst Case Concentration of the Company	24 hours	98,68	-	-	240	41,12%
	Annual	10,45	-	-	80	13,07%

Source: Author

Maximum Concentration in Receptors

A total of five receivers were identified around the project, it is observed below that no receiver had the limit of CONAMA resolution 506/2024 exceeded, even adding the two scenarios, background concentration plus concentration only the project.

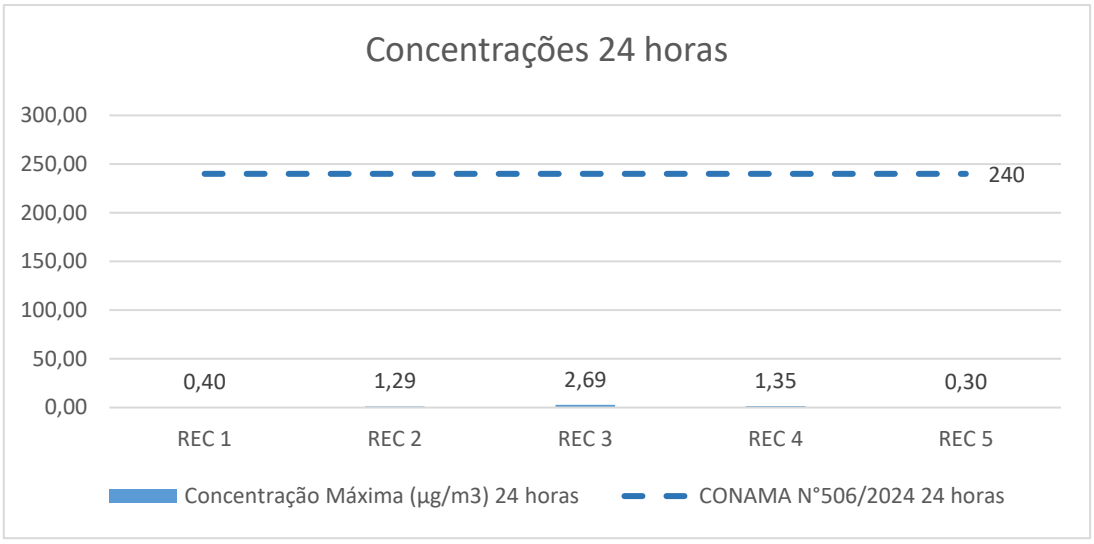
INSERTION 6-2 – Maximum Concentration in Receptors – TSP

Scenario	Average Time	Max. Concentration (µg/m3)					CONAMA N°506/2024
		REC1	REC2	REC3	REC4	REC5	
Background Concentration	24 hours	86,9	86,9	86,9	86,9	86,9	240
	Annual	4,55	4,55	4,55	4,55	4,55	80
Concentration Worst Case for the Company	24 hours	0,40	1,29	2,69	1,35	0,30	240
	Annual	0,02	0,19	0,54	0,13	0,03	80
Background Concentration + Worst Case Concentration of the Company	24 hours	87,30	88,19	89,59	88,25	87,20	240
	Annual	4,57	4,74	5,08	4,67	4,58	80

Source: Author

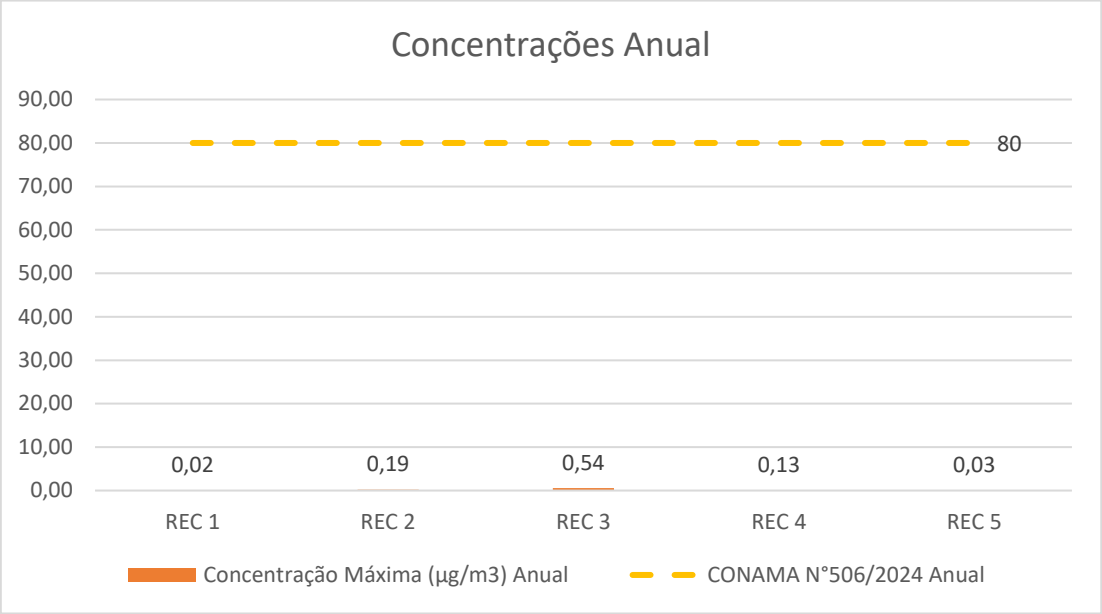
In the insertions below, the results are observed in graphic representation, comparing with the legal limit(s).

INSERTION 6-3 – Results in Receptors for 24h Concentrations of TSP



Source: Author

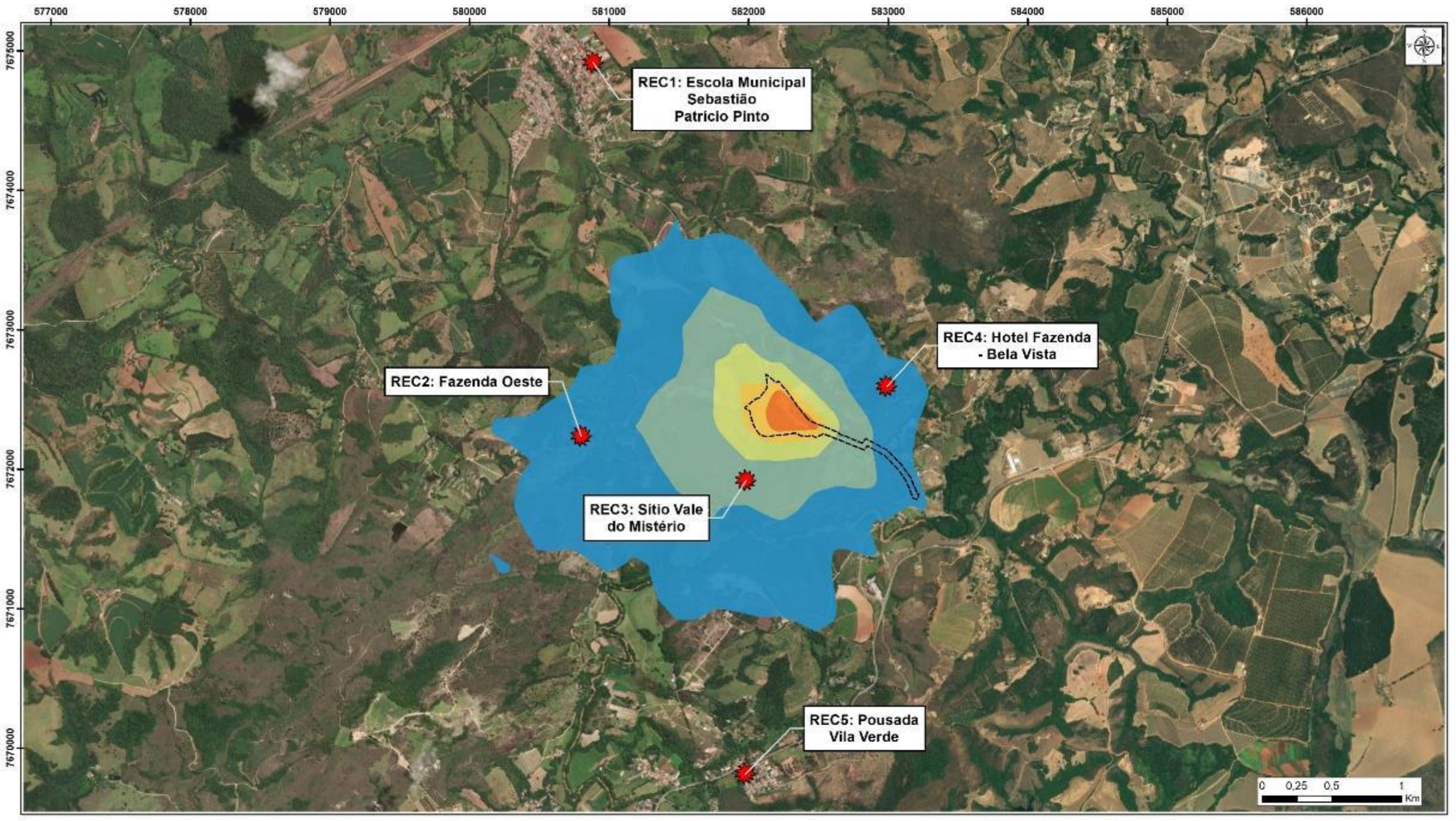
INSERTION 6-4 - Results at Receptors for Annual PTS Concentrations



Source: Author

The following insertions show the pollutant dispersion plumes for the short-term (24h) and long-term (annual) periods, respectively.

INSERTION 6-5 - Concentration Isolines - TSP (Maximum 24 h)



LEGENDA

- Receptores
- Área Diretamente Afetada - ADA

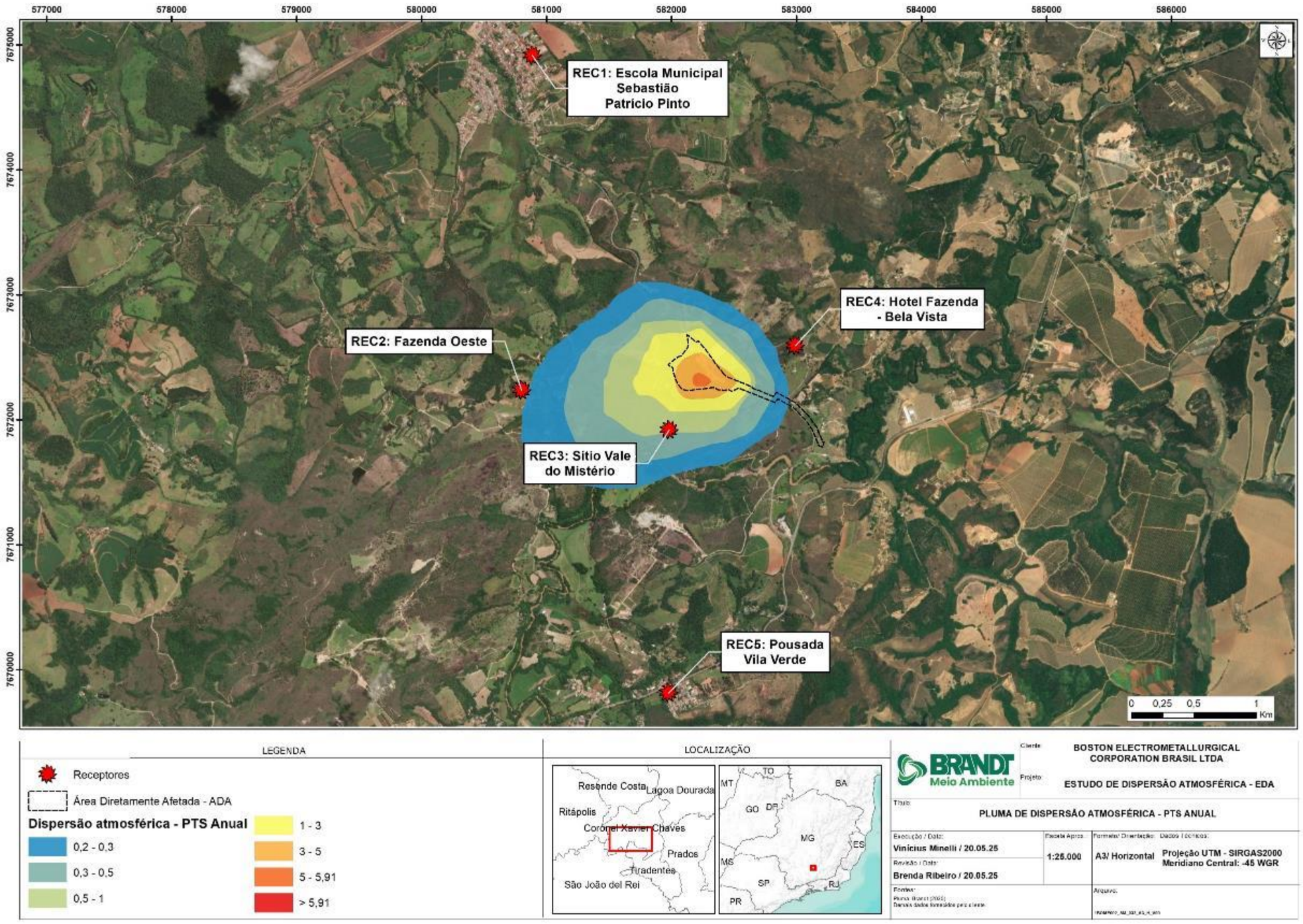
Dispersão atmosférica - PTS 24h

- 1 - 2
- 2 - 4
- 4 - 8
- 8 - 10,5
- 10,5 - 11,78
- > 11,78

LOCALIZAÇÃO

Cliente:	BOSTON ELECTROMETALLURGICAL CORPORATION BRASIL LTDA
Projeto:	ESTUDO DE DISPERSÃO ATMOSFÉRICA - EDA
Título:	PLUMA DE DISPERSÃO ATMOSFÉRICA - PTS 24H
Execução / Data: Vinicius Minelli / 20.05.25	Escala Aprox.: 1:25.000
Revisão / Data: Brenda Ribeiro / 20.05.25	Formato/ Orientação: A3/ Horizontal
Fontes: Planet (2025) Demais dados fornecidos pelo cliente.	Dados Técnicos: Projeção UTM - SIRGAS2000 Meridiano Central: -45 WGR
	Arquivo:

INSERTION 6-6 - Concentration Isolines - TSP (Annual Average)



6.2 Inhalable Particles (PM10)

Particulate matter PM10 (Inhalable Particles) comprises particles with an aerodynamic diameter of up to 10 micrometers. According to CONAMA Resolution No. 506/2024, the maximum concentration limits established by the Initial Intermediate Standard PI-2 are 100 µg/m³ for the 24-hour period and 35 µg/m³ as an annual average.

According to the World Health Organization (WHO), the maximum concentration limit allowed by Intermediate Target 1 (MI-1) is 150 µg/m³ in 24 hours and 70 µg/m³ annually. The final guide values recommended by the WHO are more restrictive, setting the limits at 45 µg/m³ for the 24-hour period and 15 µg/m³ as the annual average.

Maximum concentration of the Project only

The air quality assessment by modeling aims to verify compliance with established national standards. Based on the simulations referring exclusively to the project's emissions, the maximum concentration of PM10 predicted for the 24-hour period was 5.56 µg/m³, while the estimated annual average was 1.5 µg/m³.

The maximum contribution modeled for PM10 represents approximately 5.56% of the national limit for 24 hours and 4.28% of the annual limit, according to the standards established by CONAMA Resolution No. 506/2024.

When compared to the World Health Organization (WHO) guide values:

- Intermediate Target 1 (MI-1): the contribution represents about 3.7% of the daily limit (24h) and 2.14% of the annual limit;

- WHO Final Guide Value: the contribution reaches 12.35% of the daily limit (24h) and 9.99% of the annual limit.

These results demonstrate that the predicted concentrations do not exceed national air quality standards, according to CONAMA Resolution No. 506/2024, nor the limits established by the World Health Organization (WHO), including in the most restrictive goals aimed at protecting human health.

Background Concentration + Maximum Modeling Concentration

For the analysis of the combined scenario, the highest concentration of the bottom recorded, referring to the dry period, was considered. The sum of the background concentration with the maximum concentration estimated by the modeling, for the short term (24 hours), resulted in 43.01 µg/m³, while for the long term (annual average), the total estimated concentration was 3.46 µg/m³.

The maximum combined contribution to MP_{10} represents approximately 43.01% of the national 24-hour limit and 9.88% of the annual limit, as established by CONAMA Resolution No. 506/2024.

When compared to the World Health Organization (WHO) guide values:

- Intermediate Target 1 (MI-1): the final scenario reaches 28.67% of the daily limit (24h) and 4.94% of the annual limit;

- WHO Final Guide Value: the final scenario reaches 95.57% of the daily limit (24h) and 23.05% of the annual limit.

It can be concluded that the predicted concentrations do not exceed national air quality standards, according to CONAMA Resolution No. 506/2024, nor the limits established by the World Health Organization (WHO), including in the most restrictive goals aimed at protecting human health.

In general, the contribution of the project, when considered in isolation, is classified as insignificant in relation to the balance of the atmospheric basin, especially when compared to current levels of air quality. Thus, there is no occurrence of relevant impacts on public health in the conditions analyzed.

INSERTION 6-7 - Maximum Concentration for PM10

Scenario	Average Time	Max. Concentration (µg/m3)	Coordinates		CONAMA N°506/2024	WHO (2021)		% CONAMA N°506/2024	% WHO (2021)	
			x	y		MI-1	Final Guide Values		MI-1	Final Guide Values
Background Concentration	24 hours	37,45	582368	7672359	100	150	45	37,45%	24,97%	83,22%
	Annual	1,96	582368	7672359	35	70	15	5,60%	2,80%	13,07%
Concentration Worst Case for the Company	24 hours	5,56	582232	7672559	100	150	45	5,56%	3,70%	12,35%
	Annual	1,50	582232	7672309	35	70	15	4,28%	2,14%	9,99%
Background Concentration + Worst Case Concentration of the Company	24 hours	43,01	-	-	100	150	45	43,01%	28,67%	95,57%
	Annual	3,46	-	-	35	70	15	9,88%	4,94%	23,05%

Source: Author

Maximum Concentration in Receptors

Five receivers were identified around the project, and it is observed that in none of them the limits established by CONAMA Resolution No. 506/2024 or by the WHO guide values were exceeded, both for the 24-hour standards and for the annual average. This conclusion holds even considering the combined scenario, i.e., the sum of the background concentration with the estimated maximum contribution of the project.

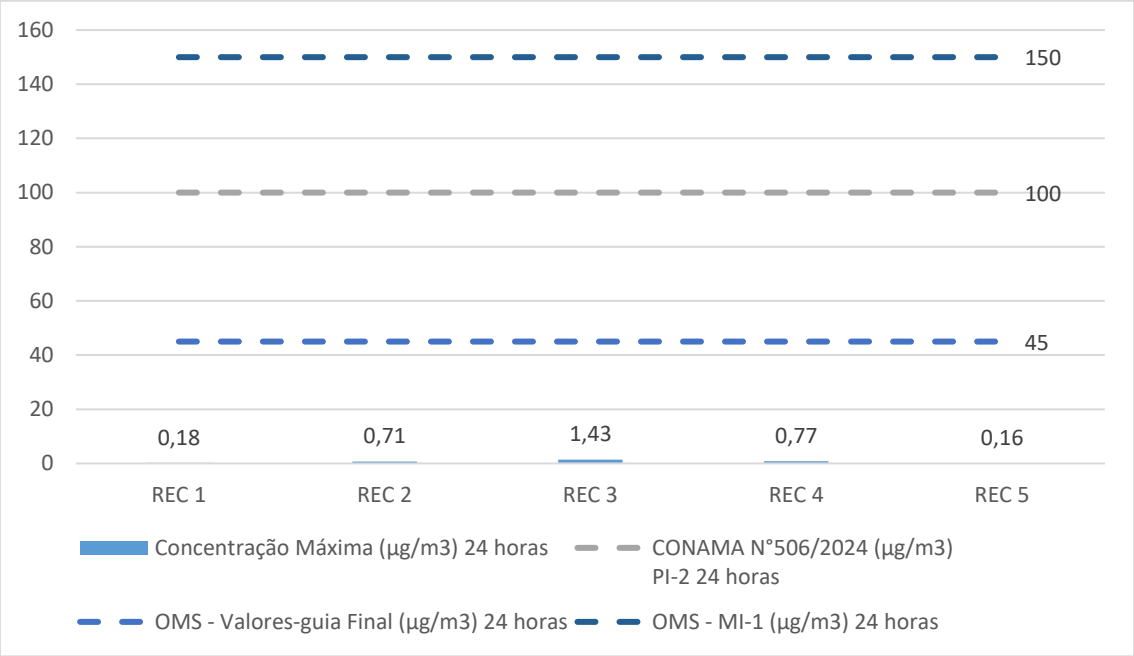
INSERTION 6-8 - Maximum Concentration in MP10 Receivers

Scenario	Average Time	Max. Concentration (µg/m3)					CONAMA N°506/2024	WHO (2021)	
		REC1	REC2	REC3	REC4	REC5		MI-1	Final Guide Values
Background Concentration	24 hours	37,45	37,45	37,45	37,45	37,45	100	150	45
	Annual	1,96	1,96	1,96	1,96	1,96	35	70	15
Concentration Worst Case for the Company	24 hours	0,18	0,71	1,43	0,77	0,16	100	150	45
	Annual	0,009	0,102	0,210	0,046	0,012	35	70	15
Background Concentration + Worst Case Concentration of the Company	24 hours	37,63	38,16	38,88	38,22	37,61	100	150	45
	Annual	1,97	2,06	2,17	2,01	1,97	35	70	15

Source: Author

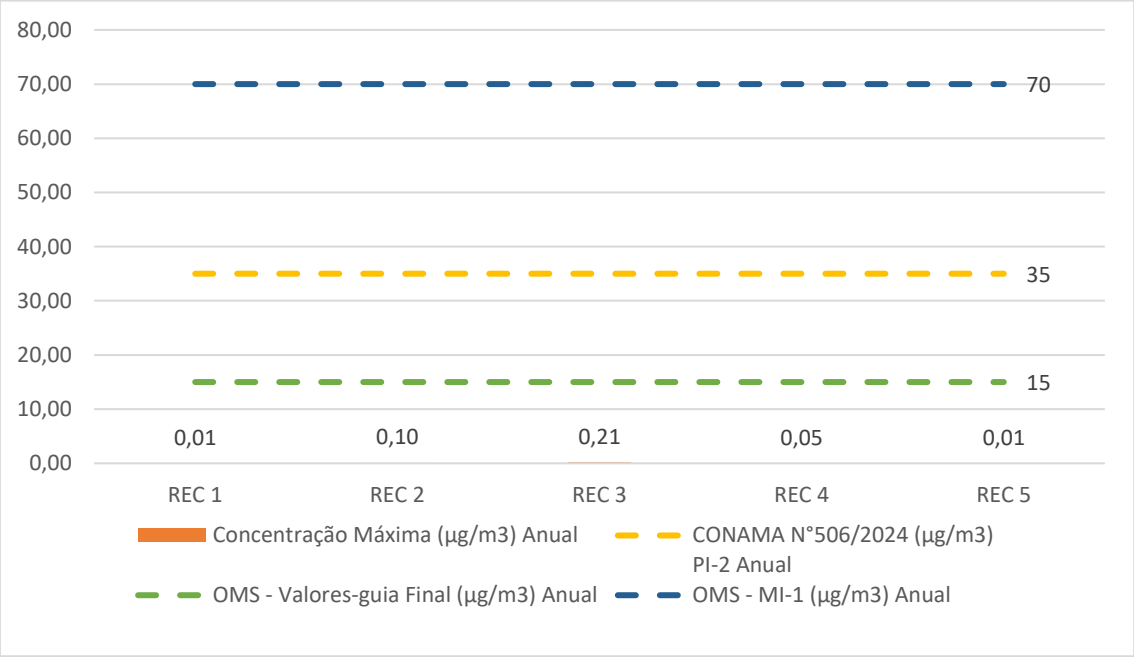
In the insertions below, the results of the receivers are observed in graphic representation, comparing them with the legal limit(s).

INSERTION 6-9 - Results in Receptors for 24h Concentrations of PM10



Source: Author

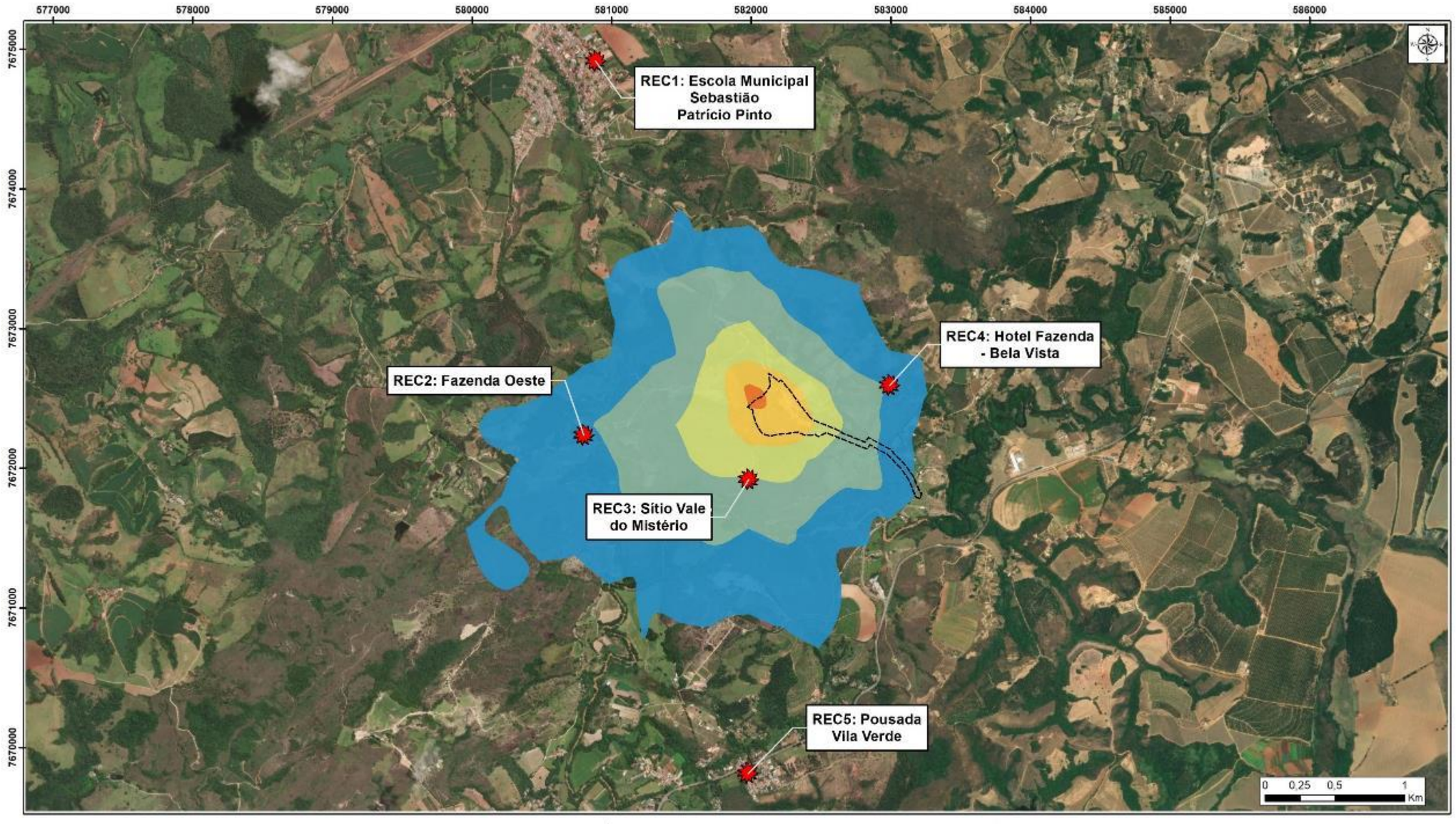
INSERTION 6-10 - Results in Receptors for Annual PM10 Concentrations



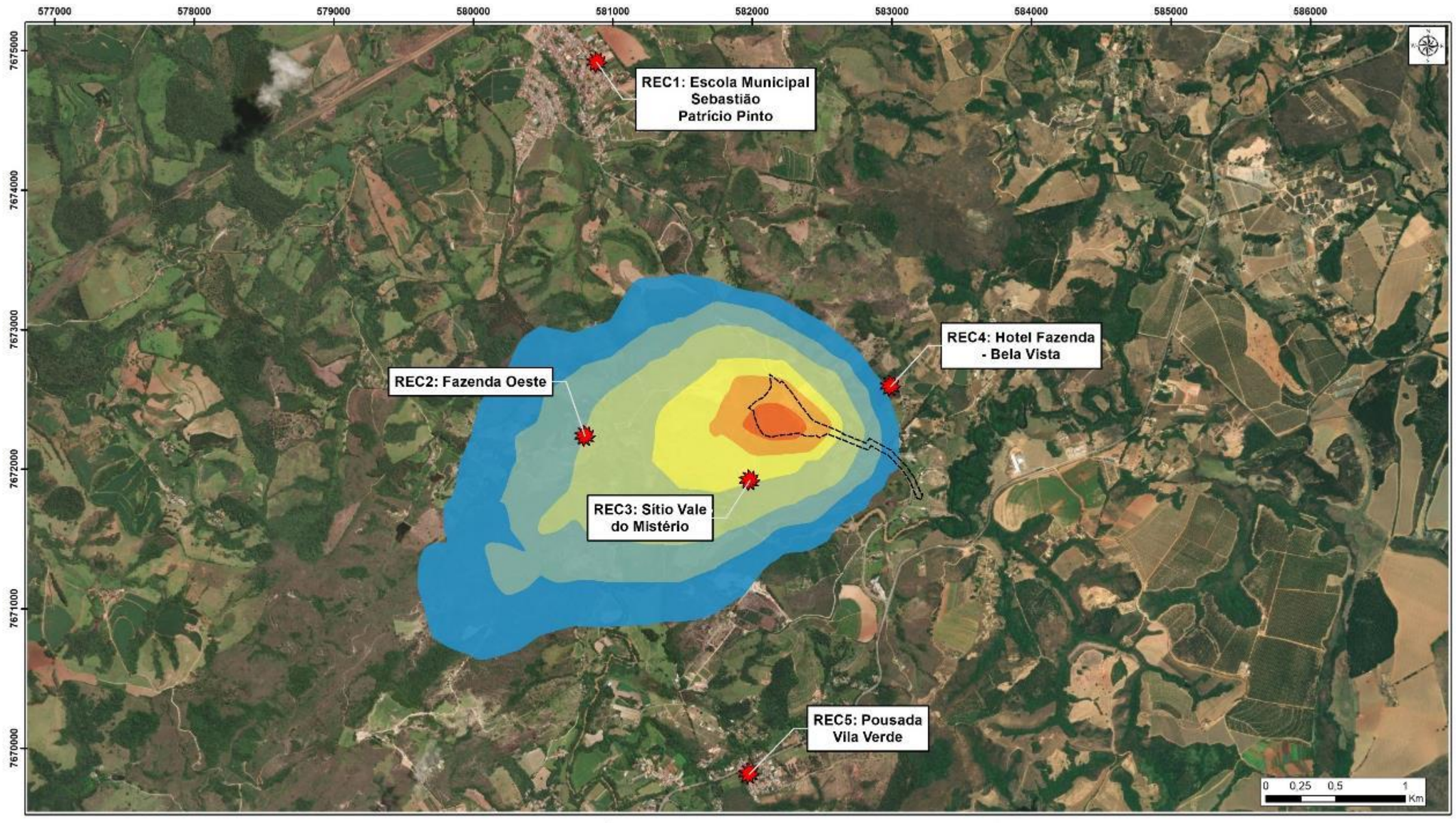
Source: Author

The following insertions show the pollutant dispersion plumes for the short-term (24h) and long-term (annual) periods, respectively.

INSERTION 6-11 - Concentration Isolines - PM10 (Maximum 24 h)



INSERTION 6-12 - Concentration Isolines - PM10 (Annual Average)



LEGENDA

- Receptores
- Área Diretamente Afetada - ADA

Dispersão atmosférica - MP10 - Anual

0,05 - 0,07	0,2 - 0,5
0,07 - 0,1	0,5 - 1
0,1 - 0,2	1 - 1,50
	> 1,50

LOCALIZAÇÃO

Cliente: BOSTON ELECTROMETALLURGICAL CORPORATION BRASIL LTDA			
Projeto: ESTUDO DE DISPERSÃO ATMOSFÉRICA - EDA			
Título: PLUMA DE DISPERSÃO ATMOSFÉRICA - MP10 ANUAL			
Execução / Data: Vinicius Minelli / 20.05.25	Escala Aprox.: 1:25.000	Formato/ Orientação: A3/ Horizontal	Dados Técnicos: Projeção UTM - SIRGAS2000 Meridiano Central: -45 WGR
Revisão / Data: Brenda Ribeiro / 20.05.25			
Fontes: Plumas: Brandt (2025) Demais dados fornecidos pelo cliente		Arquivo:	

6.3 Fine or Respirable Inhalable Particulate Matter (PM2.5)

Particulate matter PM2.5 (Respirable Particles) comprises particles with an aerodynamic diameter of up to 2.5 micrometers. According to CONAMA Resolution No. 506/2024, the maximum concentration limits established by the Initial Intermediate Standard PI-2 are 50 µg/m³ for the 24-hour period and 17 µg/m³ as an annual average.

According to the World Health Organization (WHO), the maximum concentration limit allowed by Intermediate Target 1 (MI-1) is 75 µg/m³ in 24 hours and 35 µg/m³ annually. The final guide values recommended by the WHO are more restrictive, setting the limits at 15 µg/m³ for the 24-hour period and 5 µg/m³ as the annual average.

Maximum concentration of the Project only

The air quality assessment by modeling aims to verify compliance with established national standards. Based on the simulations referring exclusively to the project's emissions, the maximum concentration of PM2.5 predicted for the 24-hour period was 4.58 µg/m³, while the estimated annual average was 0.81 µg/m³.

The maximum modeled contribution for PM2.5 represents approximately 9.17% of the national limit for 24 hours and 4.77% of the annual limit, according to the standards established by CONAMA Resolution No. 506/2024.

When compared to the World Health Organization (WHO) guide values:

- Intermediate Goal 1 (MI-1): the contribution represents about 6.11% of the daily limit (24h) and 2.32% of the annual limit;

- WHO Final Guide Value: the contribution reaches 30.55% of the daily limit (24h) and 16.22% of the annual limit.

These results demonstrate that the predicted concentrations do not exceed national air quality standards, according to CONAMA Resolution No. 506/2024, nor the limits established by the World Health Organization (WHO), including in the most restrictive goals aimed at protecting human health.

Background Concentration + Maximum Modeling Concentration

For the analysis of the combined scenario, the highest concentration of the bottom recorded, referring to the dry period, was considered. The sum of the background concentration with the maximum concentration estimated by the modeling, for the short term (24 hours), resulted in 33.11 µg/m³, while for the long term (annual average), the total estimated concentration was 2.3 µg/m³.

The maximum combined contribution to PM2.5 represents approximately 66.23% of the national 24-hour limit and 13.55% of the annual limit, as established by CONAMA Resolution No. 506/2024.

When compared to the World Health Organization (WHO) guide values:

- Intermediate Target 1 (MI-1): The final scenario reaches 44.15% of the daily limit (24h) and 6.58% of the annual limit;

- WHO Final Guide Value: The final scenario reaches 220.75% of the daily limit (24h) and 46.08% of the annual limit.

It can be concluded that the predicted concentrations do not exceed national air quality standards, as established in CONAMA Resolution No. 506/2024, nor the limits defined by Intermediate Goal 1 (MI-1) of the World Health Organization (WHO).

In general, the contribution of the project, when considered in isolation, is classified as insignificant in relation to the balance of the atmospheric basin, especially when compared to current levels of air quality. Thus, there are no relevant impacts on public health under the conditions analyzed

However, there was an exceedance in relation to the WHO Final Guide Values for the 24-hour period, indicating that, under this more restrictive criterion, the predicted concentration exceeded the established limit.

It is important to highlight that the background concentration, by itself, already exceeds the WHO Final Guide Value for the 24-hour period by 190.2%. The company's contribution, on the other hand, represents only 30.55%, which reinforces the understanding that the enterprise is not the main responsible for the observed overtaking.
.

INSERTION 6-13 - Maximum Concentration for PM2.5

Scenario	Average Time	Max. Concentration (µg/m3)	Coordinates		CONAMA N°506/2024	WHO (2021)		% CONAMA N°506/2024	% WHO (2021)	
			x	y		MI-1	Final Guide Values		MI-1	Final Guide Values
Background Concentration	24 hours	28,53	582368	7672359	50	75	15	57,06%	38,04%	190,20%
	Annual	1,49	582368	7672359	17	35	5	8,78%	4,27%	29,87%
Concentration Worst Case for the Company	24 hours	4,58	582232	7672559	50	75	15	9,17%	6,11%	30,55%
	Annual	0,81	582232	7672309	17	35	5	4,77%	2,32%	16,22%
Background Concentration + Worst Case Concentration of the Company	24 hours	33,11	-	-	50	75	15	66,23%	44,15%	220,75%
	Annual	2,30	-	-	17	35	5	13,55%	6,58%	46,08%

Source: Author

Maximum Concentration in Receptors

Five receivers were identified in the vicinity of the project, and it was found that, in none of them, the limits established by CONAMA Resolution No. 506/2024 were exceeded, both for the 24-hour period and for the annual average.

However, when considering the combined scenario – that is, the sum of the background concentration with the maximum estimated contribution of the project – it is observed that the final guide value of the World Health Organization (WHO) for the 24-hour average was exceeded in all points evaluated, due to its more restrictive criteria.

Even so, the isolated contribution of the project is considered insignificant compared to the existing fund concentration, which, by itself, exceeds the limits of the WHO Final Guide Values. This indicates that the project, individually, does not represent a significant source of air quality degradation in the region.

Thus, under the conditions analyzed, no relevant risks to public health directly associated with the operation of the project were identified.

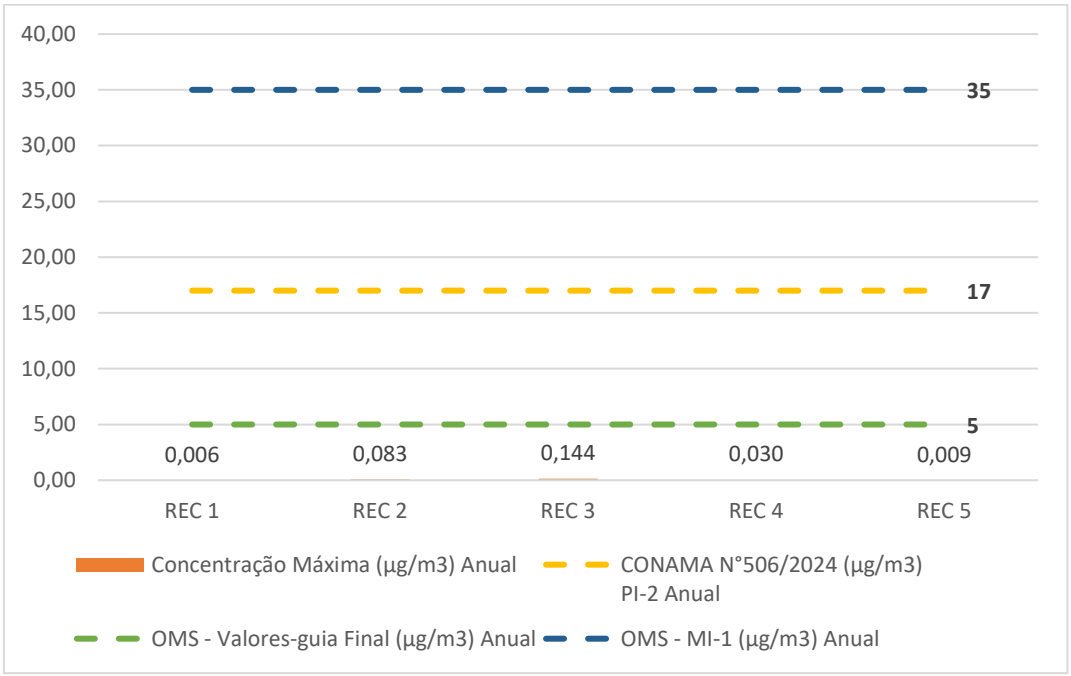
INSERTION 6-14 - Maximum Concentration in MP2.5 Receivers

Scenario	Average Time	Max. Concentration (µg/m3)					CONAMA N°506/2024	WHO (2021)	
		REC1	REC2	REC3	REC4	REC5		MI-1	Final Guide Values
Background Concentration	24 hours	28,53	28,53	28,53	28,53	28,53	50	75	15
	Annual	1,49	1,49	1,49	1,49	1,49	17	35	5
Concentration Worst Case for the Company	24 hours	0,14	0,58	1,15	0,64	0,13	50	75	15
	Annual	0,006	0,083	0,144	0,030	0,009	17	35	5
Background Concentration + Worst Case Concentration of the Company	24 hours	28,67	29,11	29,68	29,17	28,66	50	75	15
	Annual	1,50	1,58	1,64	1,52	1,50	17	35	5

Source: Author

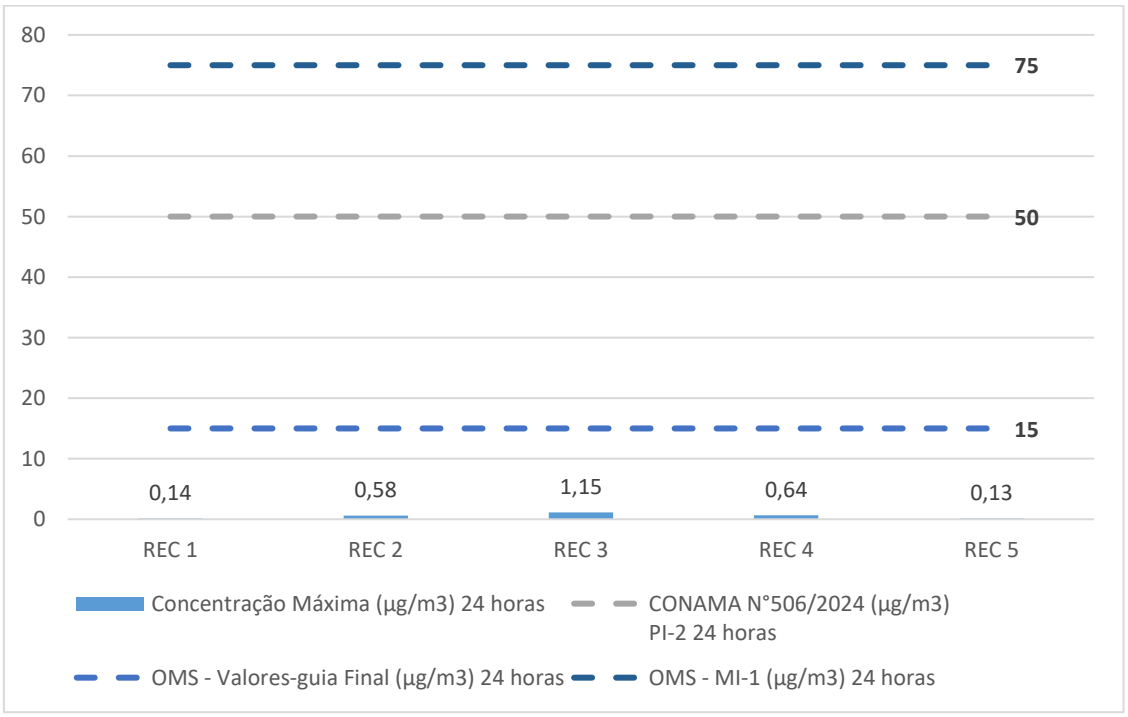
In the insertions below, the results are observed in graphic representation, comparing with the legal limit(s).

INSERTION 6-15 - Results in Receptors for 24h Concentrations of PM2.5



Source: Author

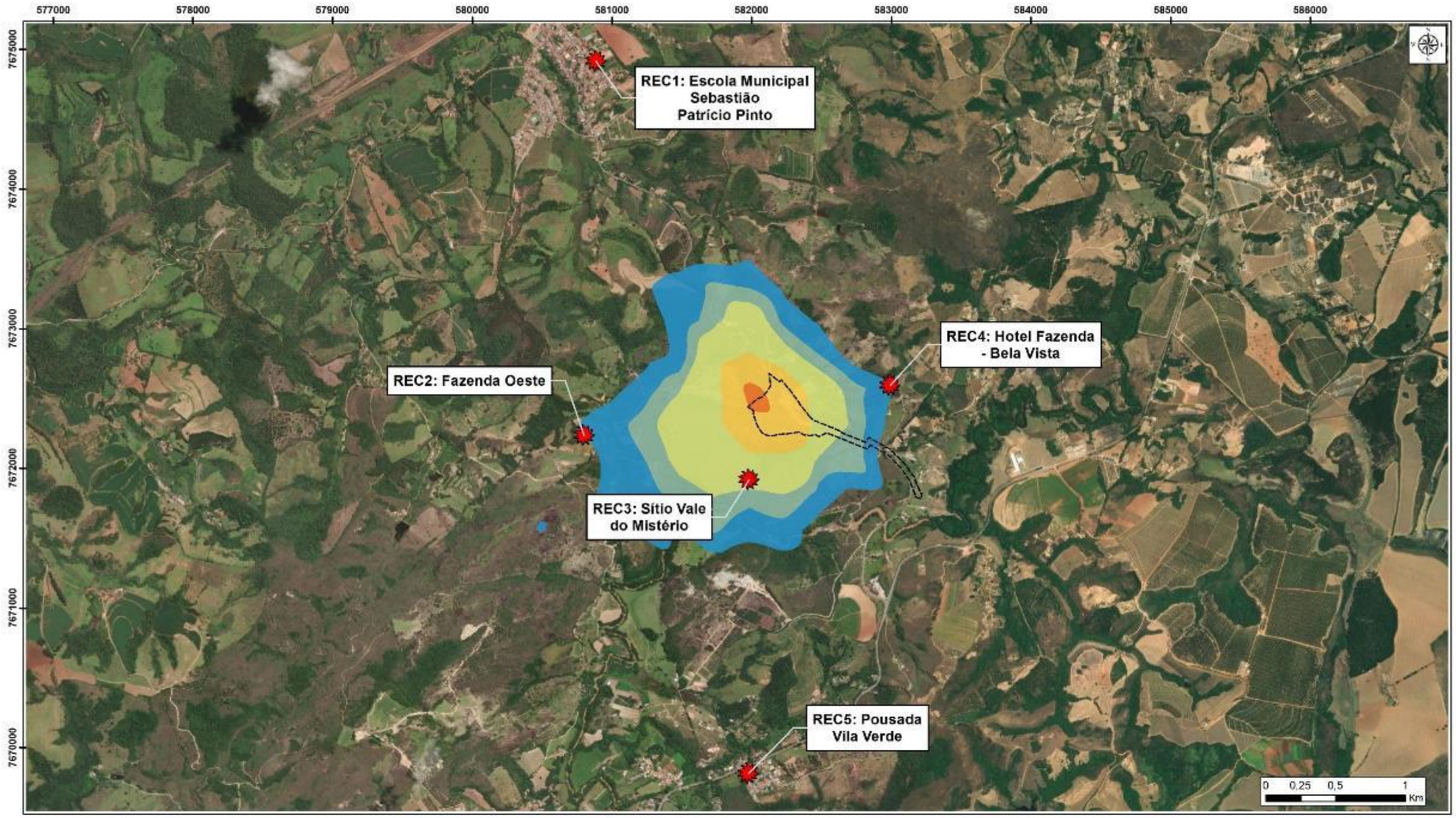
INSERTION 6-16 - Results in Receptors for Annual PM2.5 Concentrations



Source: Author

The following insertions show the pollutant dispersion plumes for the short-term (24h) and long-term (annual) periods, respectively.

INSERTION 6-17 - Concentration Isolines - PM2.5 (Maximum 24 h)



LEGENDA

- Receptores
- Área Diretamente Afetada - ADA

Dispersão atmosférica - MP2,5 24h

- 0,6 - 0,8
- 0,8 - 1
- 1 - 2
- 2 - 4
- 4 - 4,58
- > 4,58

LOCALIZAÇÃO

BRANDT Meio Ambiente

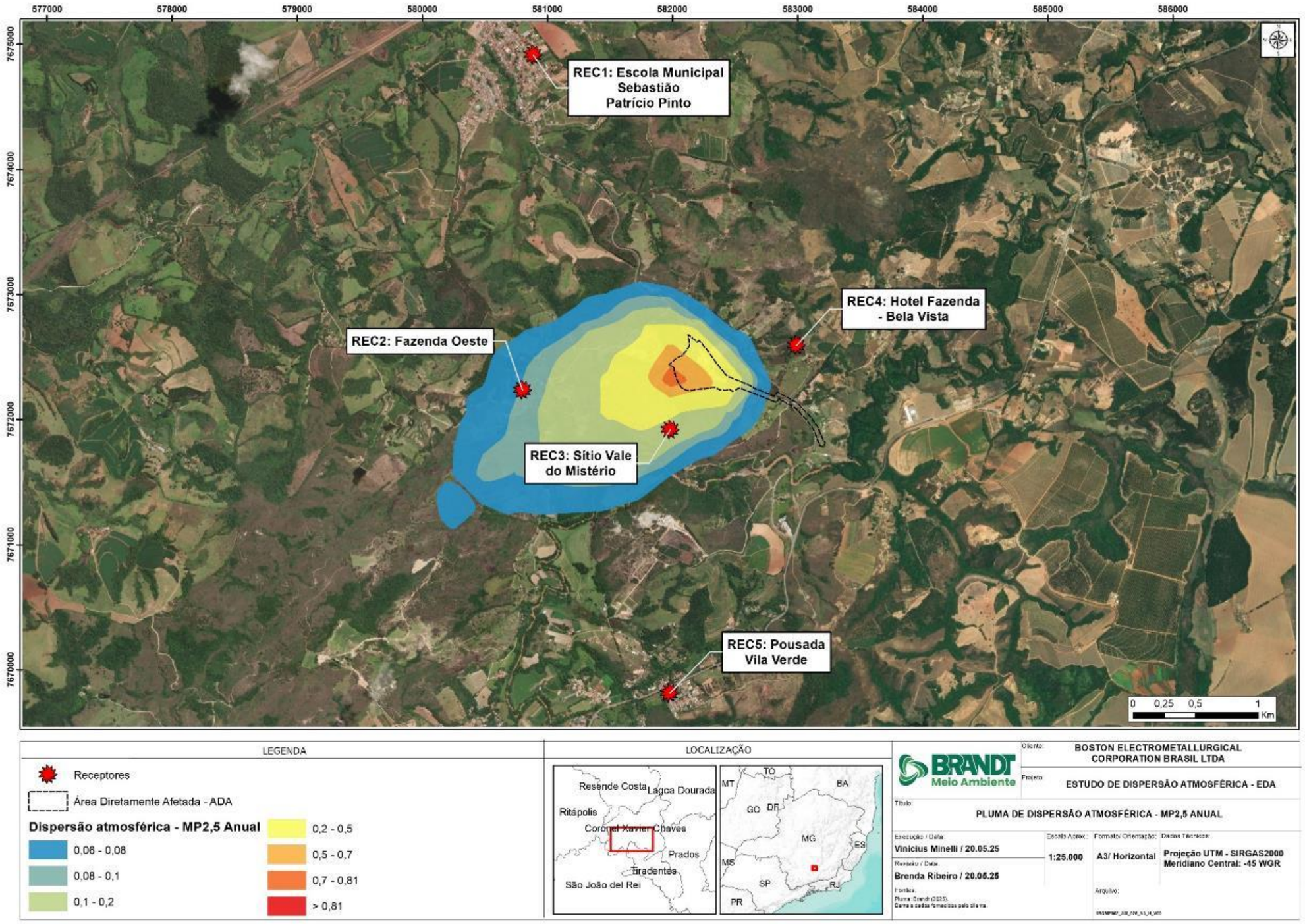
Cliente: BOSTON ELECTROMETALLURGICAL CORPORATION BRASIL LTDA

Projeto: ESTUDO DE DISPERSÃO ATMOSFÉRICA - EDA

Título: PLUMA DE DISPERSÃO ATMOSFÉRICA - MP2,5 24H

Execução / Data:	Escala Aprox.:	Formato/ Orientação:	Dados Técnicos:
Vinicius Minelli / 20.05.25	1:25.000	A3/ Horizontal	Projeção UTM - SIRGAS2000 Meridiano Central: -45 WGR
Revisão / Data: Brenda Ribeiro / 20.05.25			
Fontes: Plume Brasil (2025) Demais dados fornecidos pelo cliente.		Arquivo:	

INSERTION 6-18 - Concentration Isolines - PM2.5 (Annual Average)



6.4 Nitrogen Dioxide (NO2)

NO2 (Nitrogen Dioxide), according to CONAMA Resolution No. 506/2024, the maximum concentration limits established by the Initial Intermediate Standard PI-2 are 240 µg/m³ for the period of 1 hour and 50 µg/m³ as an annual average.

According to the World Health Organization (WHO), the maximum concentration limit allowed by Intermediate Target 1 (MI-1) is 120 µg/m³ in 24 hours and 40 µg/m³ annually. The final guide values recommended by the WHO are more restrictive, setting the limits at 25 µg/m³ for the 24-hour period and 10 µg/m³ as the annual average.

However, it is known that they are emitted from the sources of NOX emissions (nitrogen oxides) and that there is no total conversion into NO2 (which is the pollutant analyzed). Therefore, the AERMOD tool "*Environmental Ratio Method (ARM) - Tier 2*" was used, in which it presents NO2/NOX conversion criteria based on studies by the US EPA.

Maximum concentration of the Project only

The air quality assessment by modeling aims to verify compliance with established national standards. Based on the simulations referring exclusively to the project's emissions, the maximum NO2 concentration predicted for the 1-hour period was 138.15 µg/m³, for the 24-hour period it was 43.45 and the estimated annual average was 8.83 µg/m³.

The maximum modeled contribution for NO2 represents approximately 57.92% of the national limit for 1 hour and 17.65% of the annual limit, according to the standards established by CONAMA Resolution No. 506/2024.

When compared to the World Health Organization (WHO) guide values:

- Intermediate Target 1 (MI-1): the contribution represents about 36.5% of the daily limit (24h) and 22.06% of the annual limit;

- WHO Final Guide Value: the contribution reaches 175.21% of the hourly limit (1h), 803.87% of the daily limit (24h) and 88.25% of the annual limit.

It can be concluded that the predicted concentrations do not exceed national air quality standards, as established in CONAMA Resolution No. 506/2024, nor the limits defined by Intermediate Goal 1 (MI-1) of the World Health Organization (WHO).

However, there was an exceedance in relation to the WHO Final Guide Values for the 24-hour period, indicating that, under this more restrictive criterion, the predicted concentration exceeded the established limit.

Background Concentration + Maximum Modeling Concentration

For the analysis of the combined scenario, the highest concentration of the bottom recorded, referring to the dry period, was considered. The sum of the background concentration with the maximum concentration estimated by the modeling, for the short term (1 hour), resulted in 139.01 µg/m³, for the short term (24 hours) it resulted in 43.8 µg/m³, while for the long term (annual average), the estimated total concentration was 8.83 µg/m³.

The maximum combined contribution for NO2 represents approximately 57.92% of the national 1-hour limit and 17.65% of the annual limit, as established by CONAMA Resolution No. 506/2024.

When compared to the World Health Organization (WHO) guide values:

- Intermediate Target 1 (MI-1): The final scenario reaches 36.5% of the daily limit (24h) and 22.06% of the annual limit;

- WHO Final Guide Value: The final scenario reaches 175.21% of the daily limit (24h) and 88.25% of the annual limit.

Thus, it is concluded that the predicted concentrations do not exceed the national air quality standards, as established in CONAMA Resolution No. 506/2024, nor the limits defined by Intermediate Goal 1 (MI-1) of the World Health Organization (WHO).

However, there was an exceedance in relation to the WHO Final Guide Values for the 24-hour period, indicating that, under this more restrictive criterion, the predicted concentration exceeded the established limit.

However, when analyzing the average of the period (annual), it is evident that concentrations are not recurrent and should occur in isolated situations of critical episodes of atmospheric dispersion. Regarding NO2, it is important to highlight that it is a short-lived pollutant that presents peaks of concentrations in a short period, followed by long times of low concentrations. Furthermore, this pollutant is consumed to form the secondary pollutant O3 (ozone) through a photochemical reaction.

INSERTION 6-19 - Maximum Concentration for NO2

Scenario	Average Time	Max. Concentration (µg/m3)	Coordinates		CONAMA N°506/2024	WHO (2021)		% CONAMA N°506/2024	% WHO (2021)	
			x	y	PI-2	MI-1	Final Guide Values		MI-1	Final Guide Values
Background Concentration	1 hour	0,86	582368	7672359	240	-	200	0,36%	-	0,43%
	24 hours	0,35	582368	7672359	-	120	25	-	0,29%	1,40%
	Annual	0,07	582368	7672359	50	40	10	0,14%	0,18%	0,70%
Concentration Worst Case for the Company	1 hour	138,15	582232	7672559	240	-	200	57,56%	-	69,07%
	24 hours	43,45	582232	7672559	-	120	25	-	36,21%	173,81%
	Annual	8,76	582232	7672309	50	40	10	17,51%	21,89%	87,55%
Background Concentration + Worst Case Concentration of the Company	1 hour	139,01	-	-	240	-	200	57,92%	-	69,50%
	24 hours	43,80	-	-	-	120	25	-	36,50%	175,21%
	Annual	8,83	-	-	50	40	10	17,65%	22,06%	88,25%

Source: Author

Maximum Concentration in Receptors

Five receivers were identified around the project, and it is observed that in none of them the limits established by CONAMA Resolution No. 506/2024 or by the WHO guide values were exceeded, both for the 24-hour standards and for the annual average. This conclusion holds even considering the combined scenario, i.e., the sum of the background concentration with the estimated maximum contribution of the project.

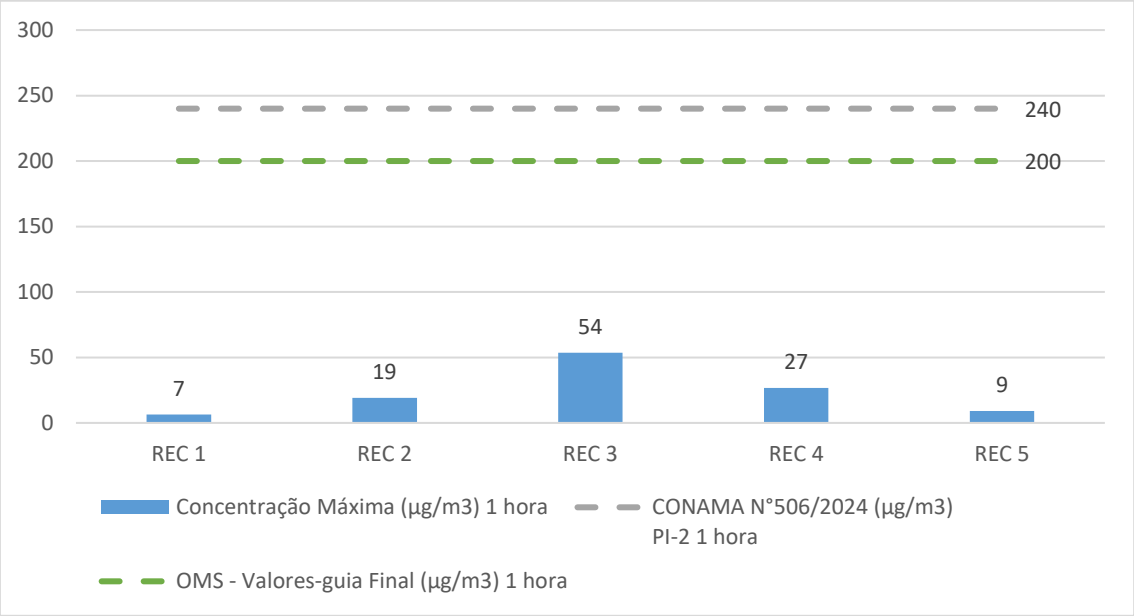
INSERTION 6-20 - Maximum Concentration in NO2 Receptors

Scenario	Average Time	Max. Concentration (µg/m3)					CONAMA N°506/2024	WHO (2021)	
		REC1	REC2	REC3	REC4	REC5		MI-1	Final Guide Values
Background Concentration	1 hour	0,86	0,86	0,86	0,86	0,86	240	-	200
	24 hours	0,35	0,35	0,35	0,35	0,35	-	120	25
	Annual	0,07	0,07	0,07	0,07	0,07	50	40	10
Concentration Worst Case for the Company	1 hour	6,52	19,25	53,68	26,75	9,20	240	-	200
	24 hours	1,24	5,38	10,67	5,84	1,20	-	120	25
	Annual	0,06	0,76	1,24	0,25	0,08	50	40	10
Background Concentration + Worst Case Concentration of the Company	1 hour	7,38	20,11	54,54	27,61	10,06	240	-	200
	24 hours	1,59	5,73	11,02	6,19	1,55	-	120	25
	Annual	0,13	0,83	1,31	0,32	0,15	50	40	10

Source: Author

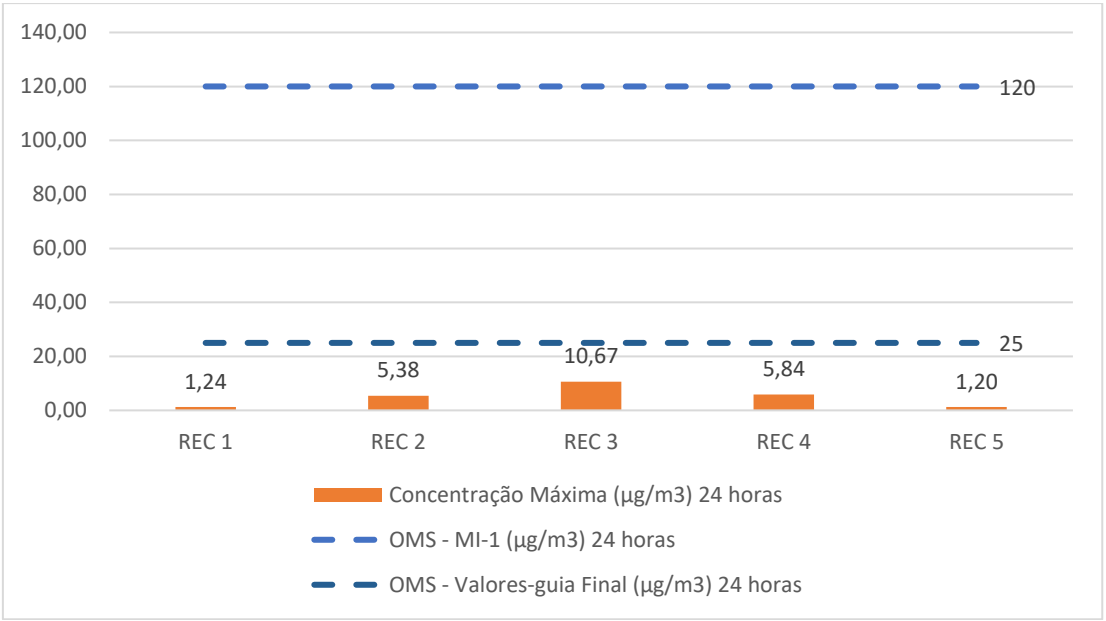
In the insertions below, the results are observed in graphic representation, comparing with the legal limit(s).

INSERTION 6-21 - Results in Receptors for 1h NO2 Concentrations



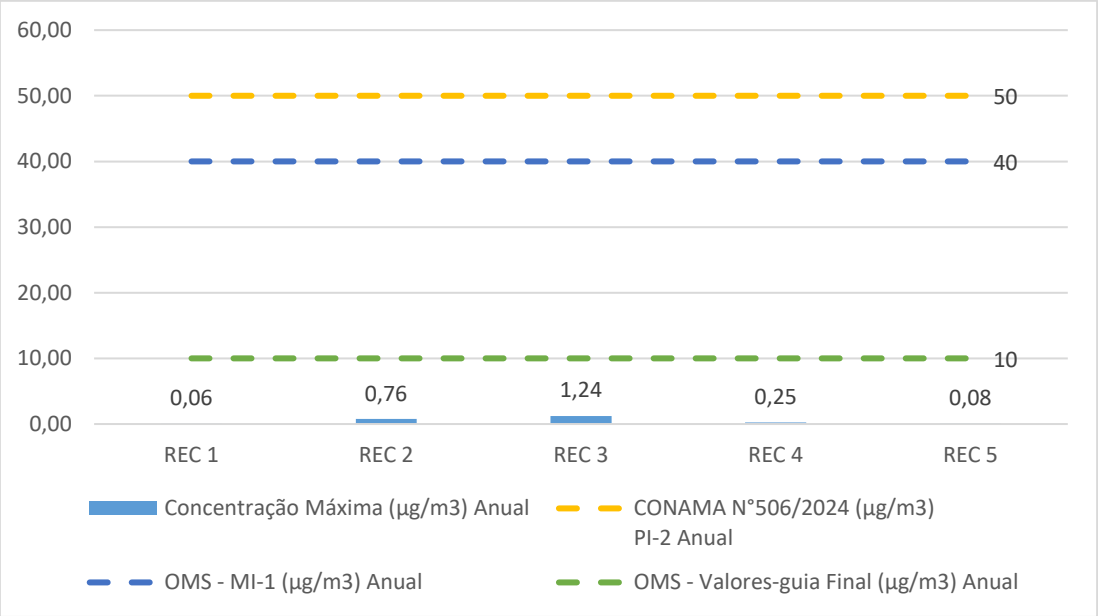
Source: Author

INSERTION 6-22 - Results in Receptors for 24h NO2 Concentrations



Source: Author

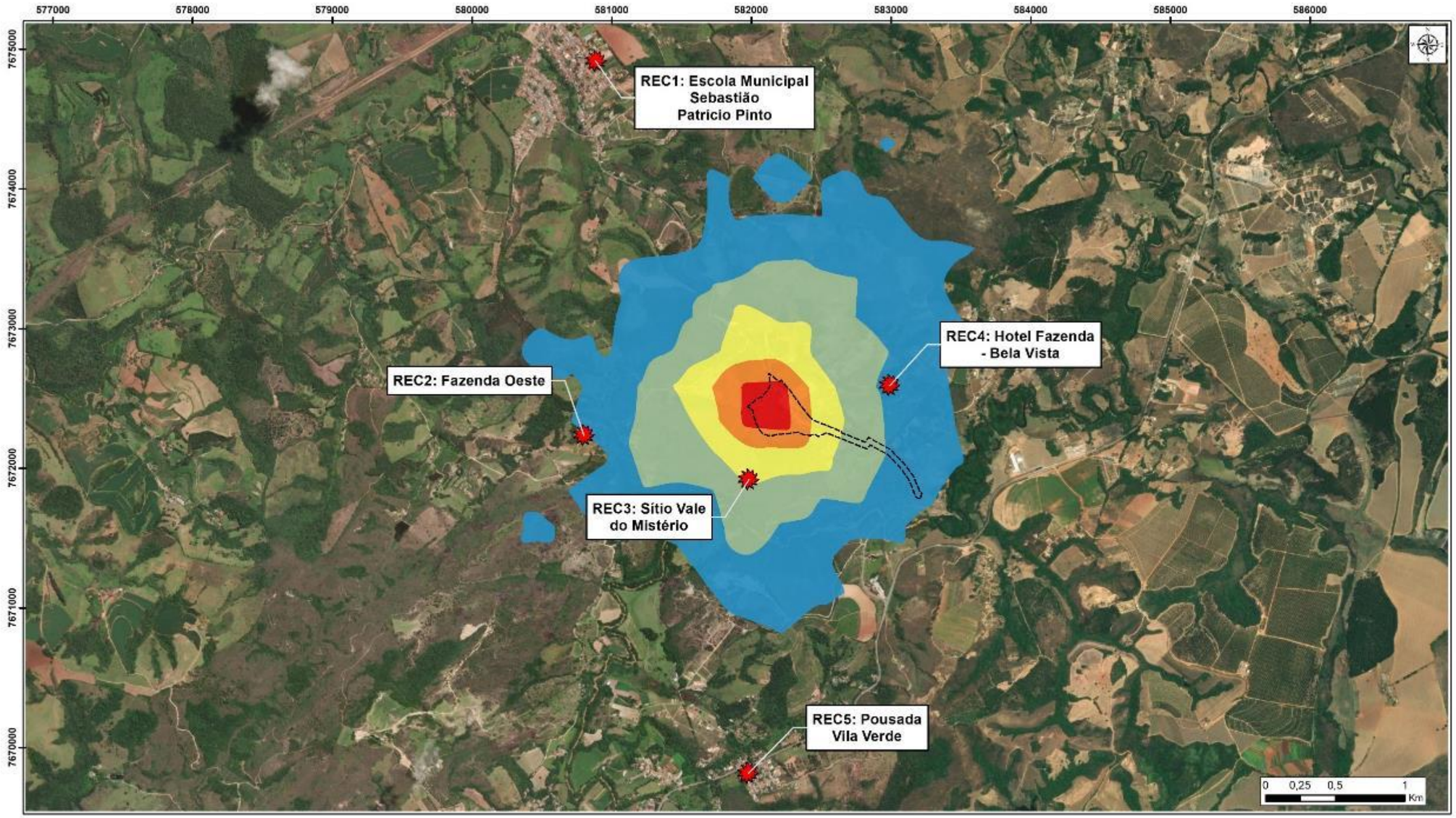
INSERTION 6-23 - Results in Receptors for Annual NO2 Concentrations



Source: Author

The following insertions show the pollutant dispersion plumes for the short-term period (1h and 24h) and long-duration (annual), respectively.

INSERTION 6-24 - Concentration Isolines - NO2 (Maximum 1 h)



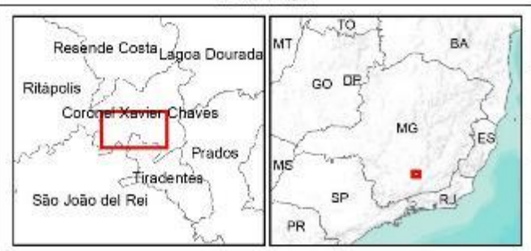
LEGENDA

- Receptores
- Área Diretamente Afetada - ADA

Dispersão atmosférica - NO2 1h

20 - 30	50 - 80
30 - 50	80 -120
	> 120

LOCALIZAÇÃO



BRANDT Meio Ambiente

Cliente: BOSTON ELECTROMETALLURGICAL CORPORATION BRASIL LTDA

Projeto: ESTUDO DE DISPERSÃO ATMOSFÉRICA - EDA

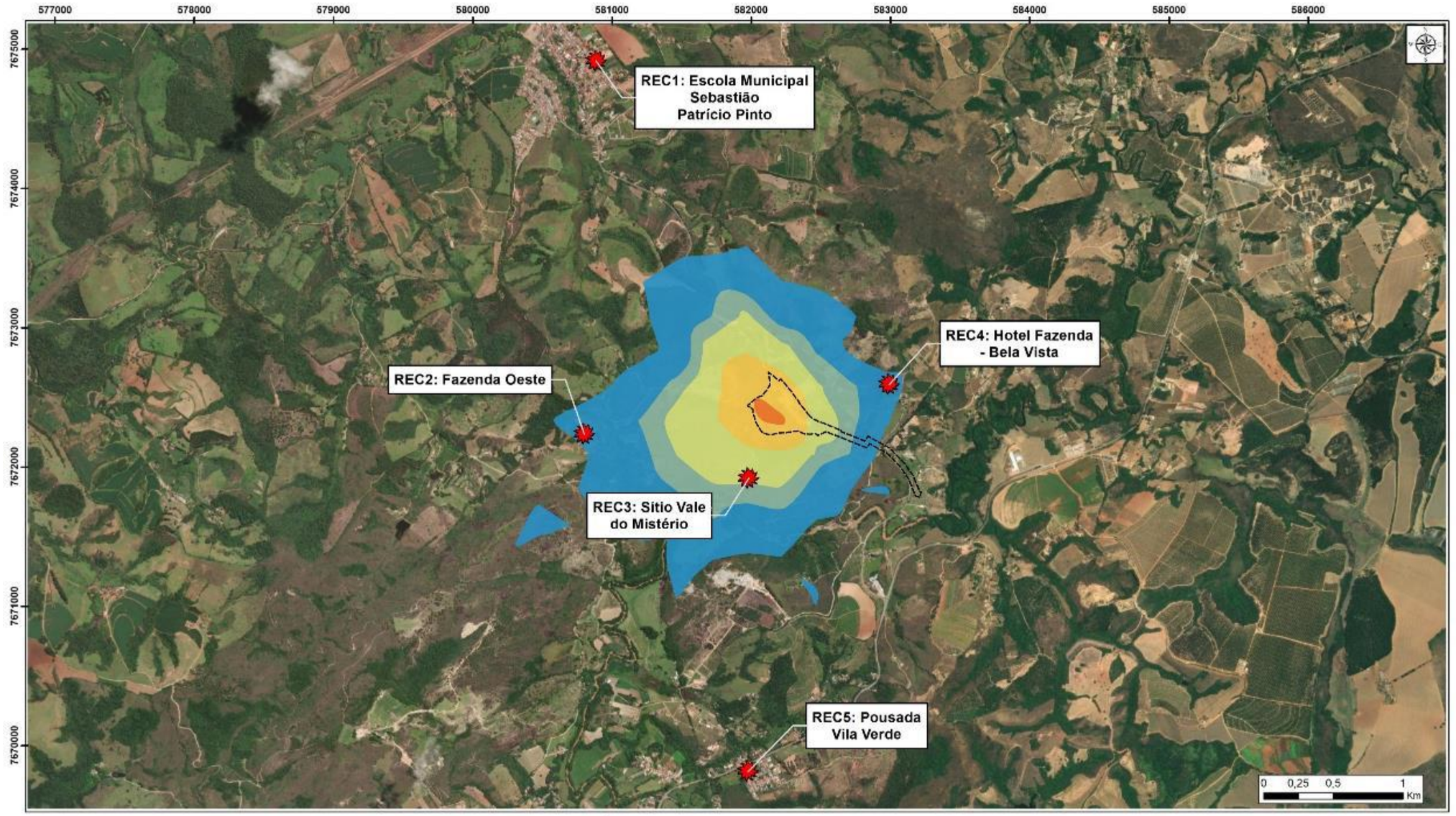
Título: PLUMA DE DISPERSÃO ATMOSFÉRICA - NO2 1H

Execução / Data:	Escala Aprox.:	Formato / Orientação:	Datum / Projeção:
Vinicius Minelli / 20.05.25	1:25.000	A3/ Horizontal	Projeção UTM - SIRGAS2000 Meridiano Central: -45 WGR
Revisão / Data: Brenda Ribeiro / 20.05.25			

Fontes: Pluma: Brandt (2025) Demais dados fornecidos pelo cliente.

Arquivo:

INSERTION 6-25 - Concentration Isolines - NO2 (Maximum 24 h)



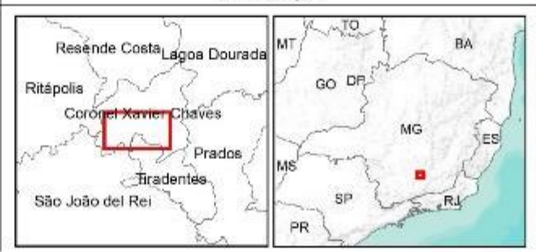
LEGENDA

- Receptores
- Área Diretamente Afetada - ADA

Dispersão atmosférica - NO2 24h

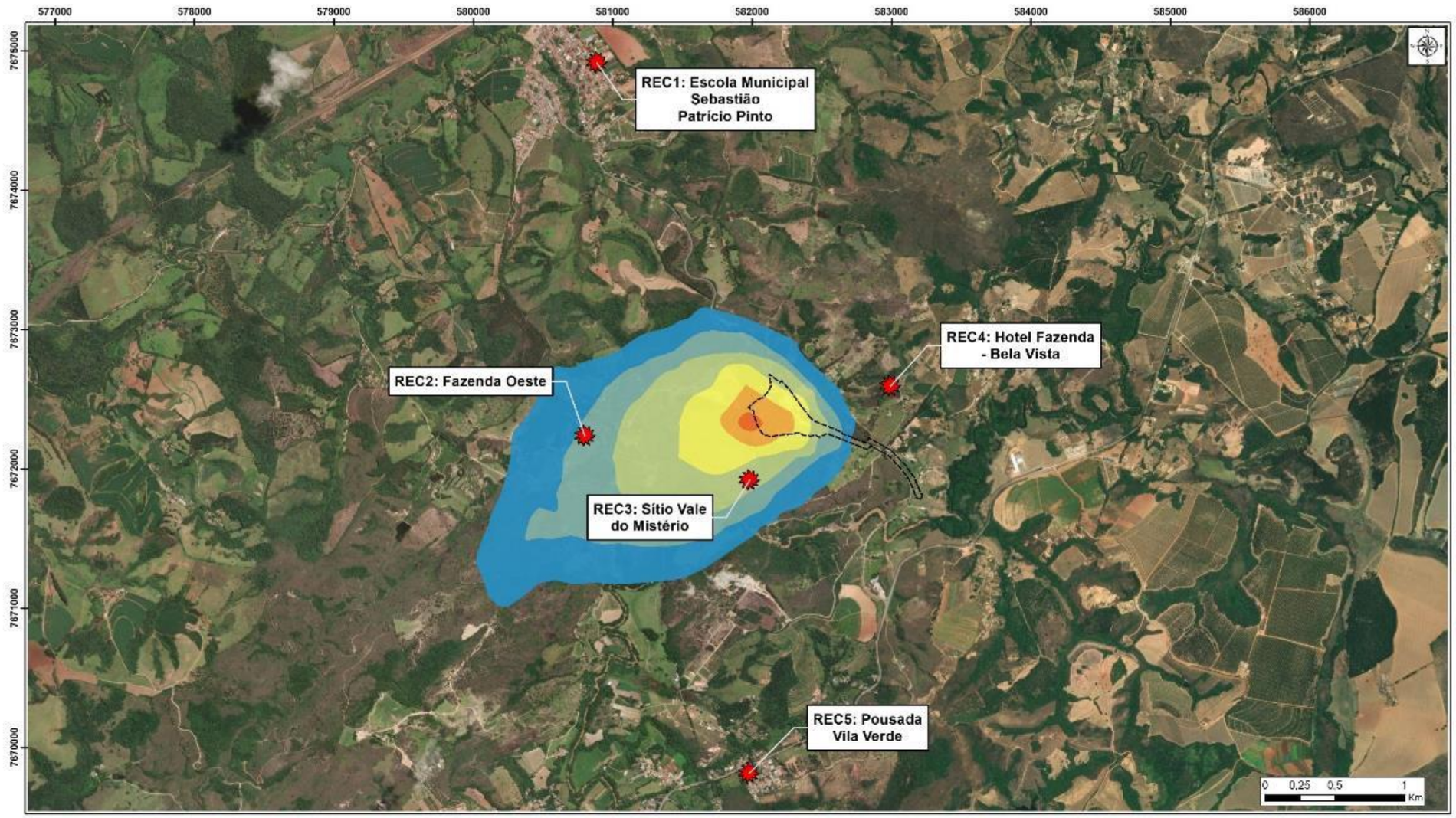
- 5 - 8
- 8 - 10
- 10 - 20
- 20 - 40
- 40 - 43,45
- > 43,45

LOCALIZAÇÃO



Cliente:	BOSTON ELECTROMETALLURGICAL CORPORATION BRASIL LTDA
Projeto:	ESTUDO DE DISPERSÃO ATMOSFÉRICA - EDA
Título:	PLUMA DE DISPERSÃO ATMOSFÉRICA - NO2 24H
Execução / Data: Vinicius Minelli / 20.05.25	Escala Aprox.: 1:25.000
Revisão / Data: Brenda Ribeiro / 20.05.25	Formato/ Orientação: A3/ Horizontal
Fontes: Pluma: Brandt (2025) Demais dados fornecidos pelo cliente.	Dados Técnicos: Projeção UTM - SIRGAS2000 Meridiano Central: -45 WGR
	Arquivo:

INSERTION 6-26 - Concentration Isolines - NO2 (Annual Average)



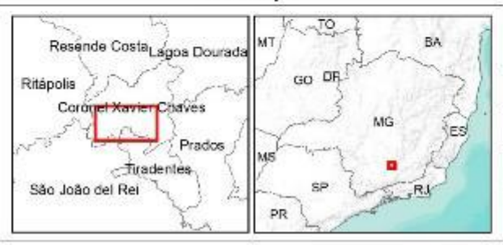
LEGENDA

- Receptores
- Área Diretamente Afetada - ADA

Dispersão atmosférica - NO2 Atual

0,5 - 0,7	2 - 4
0,7 - 1	4 - 7
1 - 2	7 - 8,76
	> 8,76

LOCALIZAÇÃO



Cliente:	BOSTON ELECTROMETALLURGICAL CORPORATION BRASIL LTDA
Projeto:	ESTUDO DE DISPERSÃO ATMOSFÉRICA - EDA
Título:	PLUMA DE DISPERSÃO ATMOSFÉRICA - NO2 ANUAL
Execução / Data: Vinicius Minelli / 20.05.25	Escala Aprox.: 1:25.000
Revisão / Data: Brenda Ribeiro / 20.05.25	Formato/Orientação: A3/ Horizontal
Fontes: Planet Brand (2025). Demais dados fornecidos pelo cliente.	Datum Técnicos: Projeção UTM - SIRGAS2000 Meridiano Central: -45 WGR
	Arquivo:

6.5 Carbon Monoxide (CO)

For the pollutant CO, according to CONAMA resolution No. 506/2024, the maximum limit allowed for the reference period in 08 hours is 9 ppm, which is approximately equivalent to 10,310 µg/m³.

According to the World Health Organization (WHO), the maximum concentration limit allowed by Intermediate Target 1 (MI-1) is 7000 µg/m³ in 24 hours. The final guide values recommended by the WHO are more restrictive, setting the limits at 10,000 µg/m³ for the 8-hour period and 4000 µg/m³ for the 24-hour period.

Maximum concentration of the Project only

The air quality assessment by modeling aims to verify compliance with established national standards. Based on the simulations referring exclusively to the project's emissions, the maximum concentration of CO predicted for the 8-hour period was 32.4 µg/m³ and for the 24-hour period was 16.03 µg/m³.

The maximum modeled contribution for CO represents approximately 0.31% of the national limit for 8 hours, according to the standards established by CONAMA Resolution No. 506/2024.

When compared to the World Health Organization (WHO) guide values for the 24-hour period:

- Intermediate Target 1 (MI-1): the contribution represents about 0.23%.
- WHO Final Guide Value: the contribution reaches 0.4% for the 24-hour period and 0.32% for the 8-hour period.

These results demonstrate that the predicted concentrations do not exceed the national air quality standards and the WHO standards, remain below the established limits, even in the strictest health protection goals.

Background Concentration + Maximum Modeling Concentration

As the identified background concentration was below the detection limit of the monitoring equipment, the only contribution considered is that from the project. In this way, the values correspond exactly to those already presented in the previous stage (maximum concentration of the Project only). It should be noted that all estimated concentrations remain within the limits established by both CONAMA Resolution No. 506/2024 and the World Health Organization (WHO) guide values.

INSERTION 6-27 - Maximum Concentration for CO

Scenario	Average Time	Max. Concentration (µg/m3)	Coordinates		CONAMA N°506/2024	WHO (2021)		% CONAMA N°506/2024	% WHO (2021)	
			x	y		MI-1	Final Guide Values		MI-1	Final Guide Values
Background Concentration	8 hours	0,00	582368	7672359	10310	-	10000	0,00%	-	0,00%
	24 hours	0,00	582368	7672359	-	7000	4000	-	0,00%	0,00%
Concentration Worst Case for the Company	8 hours	32,40	582232,1	7672559	10310	-	10000	0,31%	-	0,32%
	24 hours	16,03	582232,1	7672559	-	7000	4000	-	0,23%	0,40%
Background Concentration + Worst Case Concentration of the Company	8 hours	32,40	-	-	10310	-	10000	0,31%	-	0,32%
	24 hours	16,03	-	-	-	7000	4000	-	0,23%	0,40%

Source: Author

Maximum Concentration in Receptors

Five receivers were identified around the project, and it is observed that in none of them the limits established by CONAMA Resolution No. 506/2024 or by the WHO guide values were exceeded, both for the 8-hour standards and for the 24-hour standards.

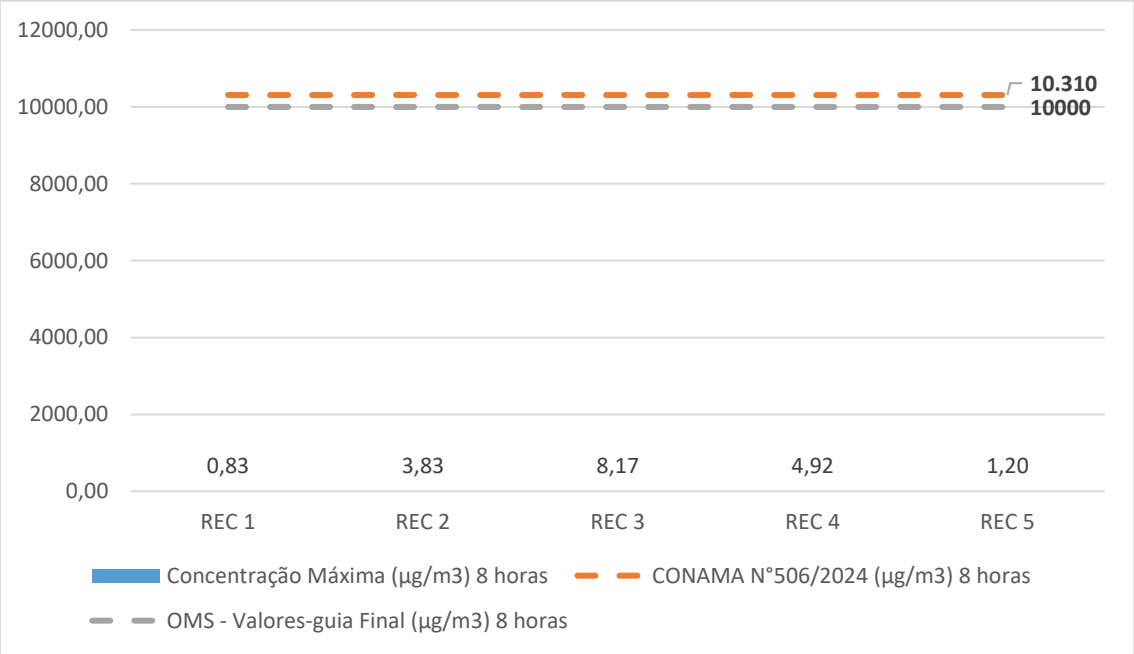
INSERTION 6-28 - Maximum Concentration in Receptors for CO

Scenario	Average Time	Max. Concentration (µg/m3)					CONAMA N°506/2024	WHO (2021)	
		REC1	REC2	REC3	REC4	REC5		MI-1	Final Guide Values
Background Concentration	8 hours	0,00	0,00	0,00	0,00	0,00	10310	-	10000
	24 hours	0,00	0,00	0,00	0,00	0,00	-	7000	4000
Concentration Worst Case for the Company	8 hours	0,83	3,83	8,17	4,92	1,20	10310	-	10000
	24 hours	0,48	1,70	3,54	1,86	0,39	-	7000	4000
Background Concentration + Worst Case Concentration of the Company	8 hours	0,83	3,83	8,17	4,92	1,20	10310	-	10000
	24 hours	0,48	1,70	3,54	1,86	0,39	-	7000	4000

Source: Author

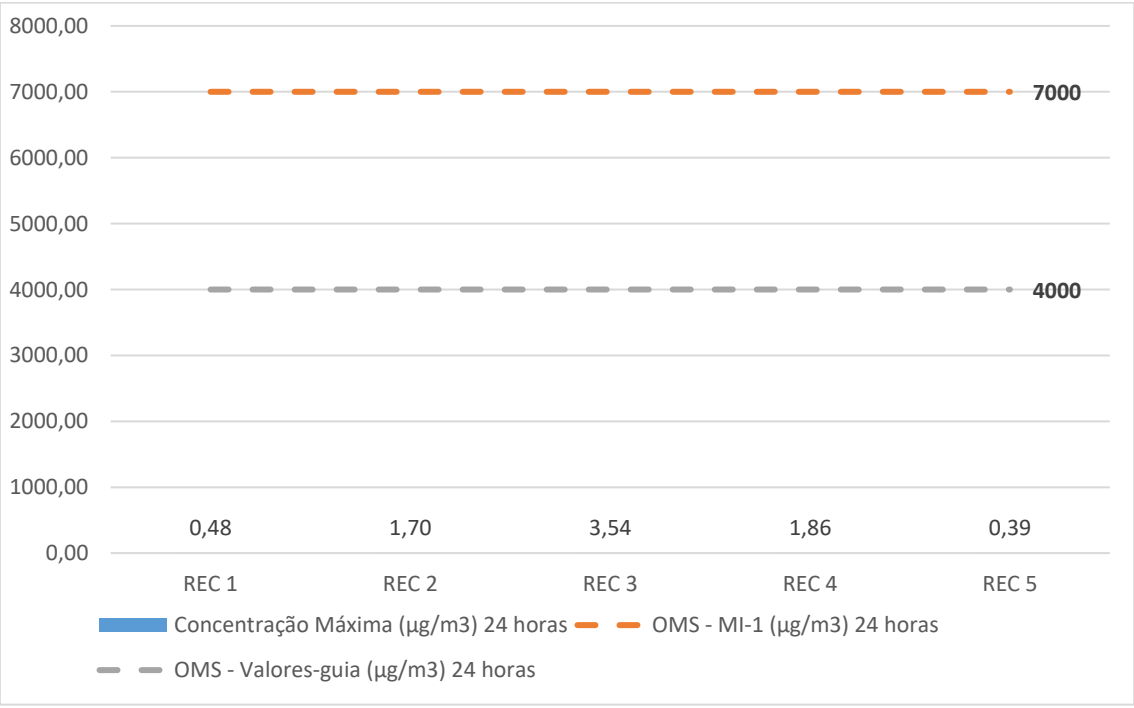
In the insertions below, the results are observed in graphic representation, comparing with the legal limit(s).

INSERTION 6-29 - Results at Receptors for 8h CO Concentrations



Source: Author

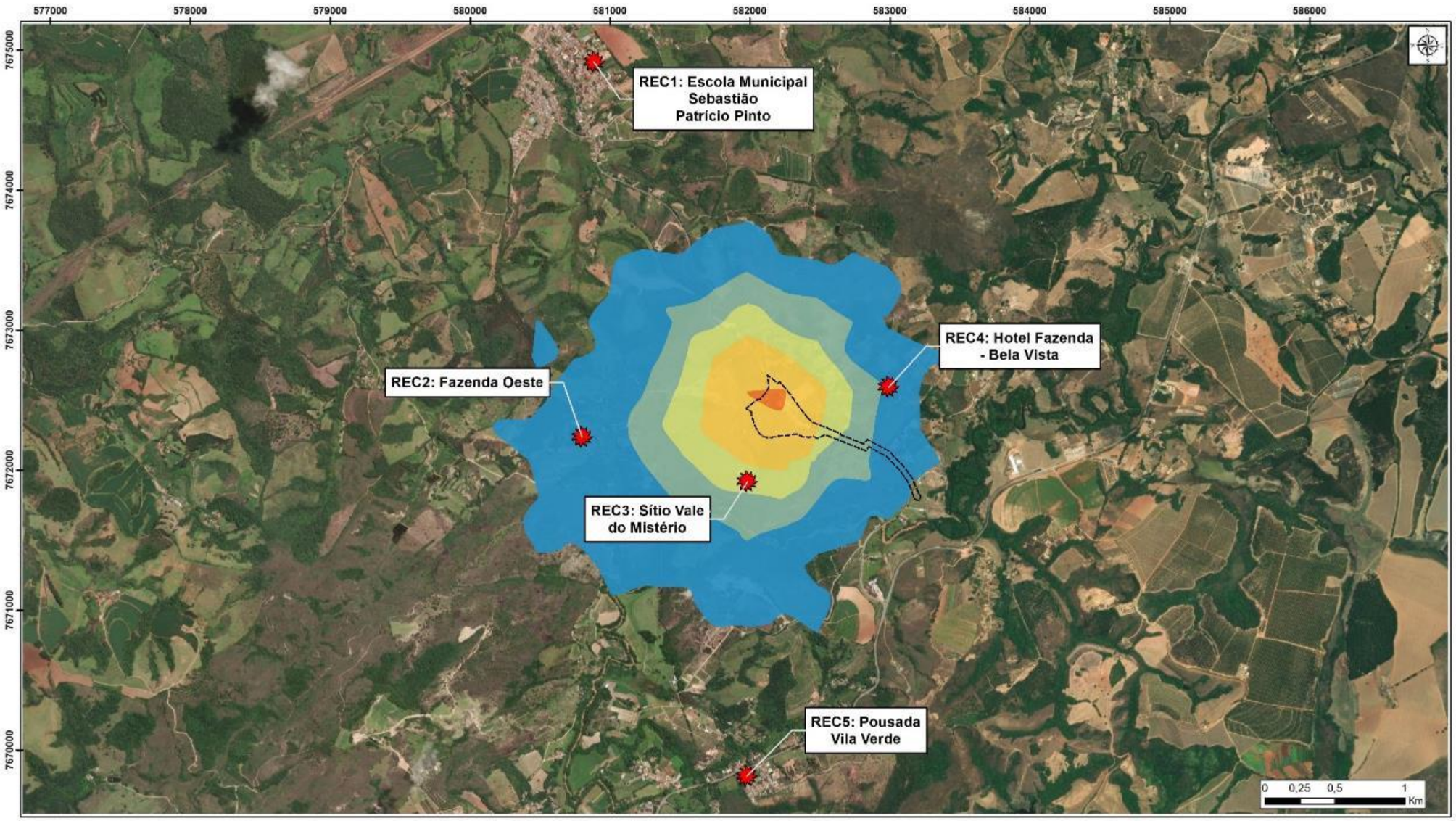
INSERTION 6-30 - Results in Receptors for 24h CO Concentrations



Source: Author

The following insertion shows the pollutant dispersion plumes for the period of 8 hours and 24 hours, respectively.

INSERTION 6-31 - Concentration Isolines - CO (Maximum 08 h)



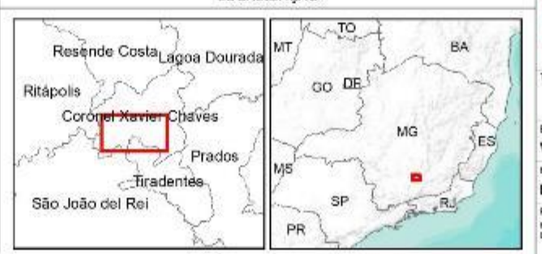
LEGENDA

- Receptores
- Área Diretamente Afetada - ADA

Dispersão atmosférica - CO 8h

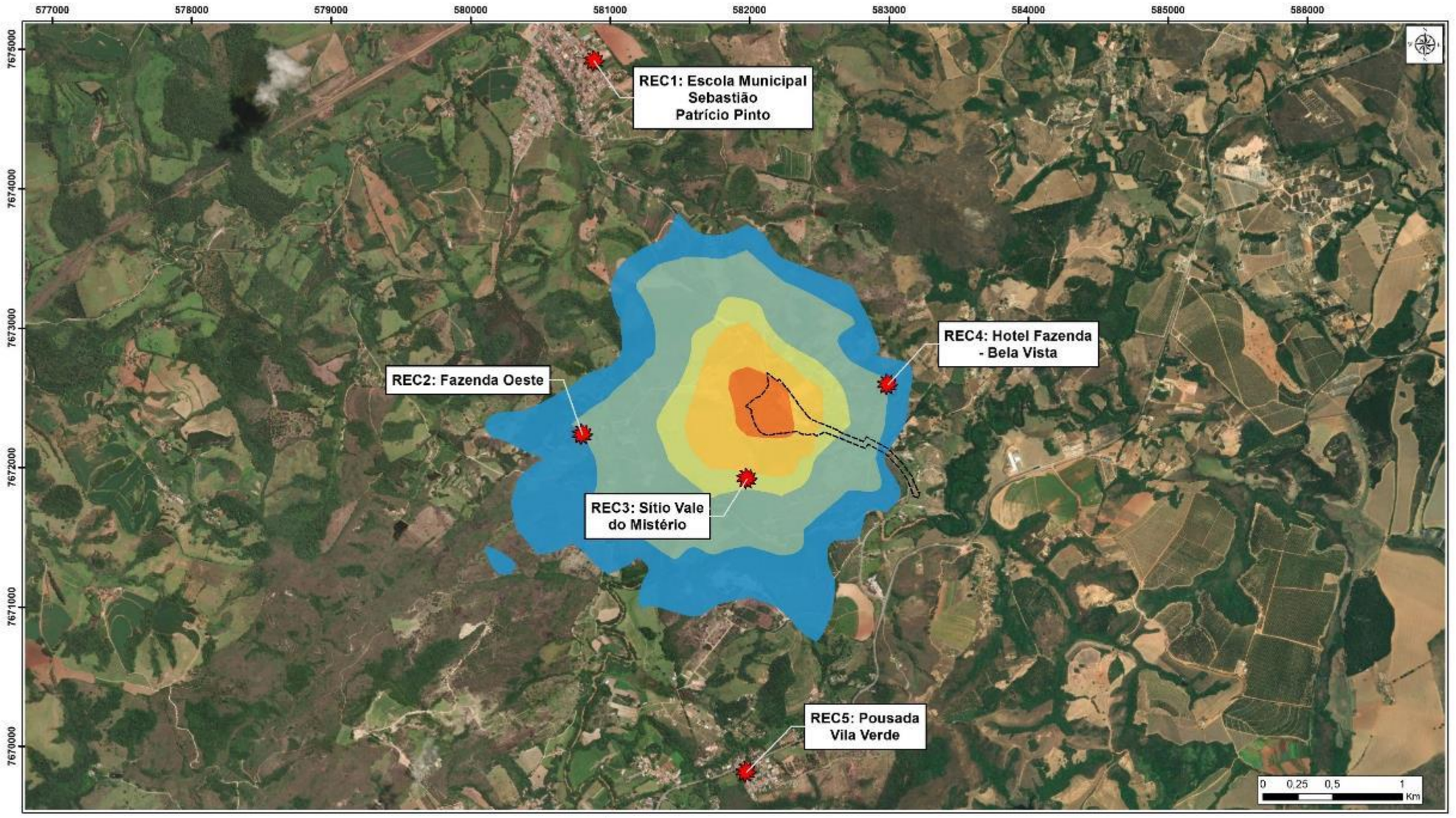
- 3 - 5
- 5 - 7
- 7 - 10
- 10 - 30
- 30 - 32,40
- > 32,40

LOCALIZAÇÃO



Cliente	BOSTON ELECTROMETALLURGICAL CORPORATION BRASIL LTDA
Projeto	ESTUDO DE DISPERSÃO ATMOSFÉRICA - EDA
Título:	PLUMA DE DISPERSÃO ATMOSFÉRICA - CO 8H
Execução / Data:	Vinícius Minelli / 20.05.25
Escala Aprox.:	1:25.000
Formato/ Orientação:	A3/ Horizontal
Dados Técnicos:	Projeção UTM - SIRGAS2000 Meridiano Central: -45 WGR
Revisão / Data:	Brenda Ribeiro / 20.05.25
Fontes:	Mapa: Brasil (2020) Demais dados fornecidos pelo cliente.
Arquivo:	

INSERTION 6-32 - Concentration Isolines - CO (Maximum 24 h)



6.6 Sulfur Dioxide (SO2)

SO2 (Sulfur Dioxide), according to CONAMA resolution No. 506/2024, the maximum allowed limit (PI-2) for the reference pollutant in 24 hours is 50 µg/m³. For the annual reference period, it is 30 µg/m³.

According to the World Health Organization (WHO), the maximum concentration limit established by Intermediate Target 1 (MI-1) is 125 µg/m³ for the 24-hour period. The more restrictive Final Guide Values, recommended by the WHO, set the limit at 40 µg/m³ for the same period.

Maximum concentration of the Project only

The air quality assessment by modeling aims to verify compliance with established national standards. Based on the simulations referring exclusively to the project's emissions, the maximum SO2 concentration predicted for the 24-hour period was 11 µg/m³, while the estimated annual average was 1.94 µg/m³.

The maximum modeled contribution for SO2 represents approximately 22% of the national limit for 24 hours and 6.47% of the annual limit, according to the standards established by CONAMA Resolution No. 506/2024.

When compared to the World Health Organization (WHO) guide values:

- Intermediate Goal 1 (MI-1): the contribution represents about 8.8% of the daily limit (24h).

- WHO Final Guide Value: the contribution reaches 27.51% of the daily limit (24h).

The results demonstrate that the predicted concentrations do not exceed national air quality standards, according to CONAMA Resolution No. 506/2024, and remain below the limits established by the World Health Organization (WHO), including in relation to the strictest goals aimed at protecting human health.

Background Concentration + Maximum Modeling Concentration

For the analysis of the combined scenario, the highest concentration of the bottom recorded, referring to the dry period, was considered. The sum of the background concentration with the maximum concentration estimated by the modeling, for the short term (24 hours), resulted in 11.77 µg/m³, while for the long term (annual average), the total estimated concentration was 1.98 µg/m³.

The maximum combined contribution for SO2 represents approximately 23.55% of the national 24-hour limit and 6.61% of the annual limit, as established by CONAMA Resolution No. 506/2024.

When compared to the World Health Organization (WHO) guide values:

- Intermediate Target 1 (MI-1): The final scenario reaches 9.42% of the daily limit (24h).

- WHO Final Guide Value: The final scenario reaches 29.43% of the daily limit (24h).

Thus, it is concluded that, even considering the combined scenario, i.e., the sum of the background concentration with the maximum contribution estimated by the modeling, the predicted SO_2 levels remain within the limits established by national and international standards, including the most restrictive parameters defined by the WHO, and do not represent relevant risks to air quality or public health.

INSERTION 6-33 - Maximum Concentration for SO2

Scenario	Average Time	Max. Concentration (µg/m3)	Coordinates		CONAMA N°506/2024	WHO (2021)		% CONAMA N°506/2024	% WHO (2021)	
			x	y		MI-1	Final Guide Values		MI-1	Final Guide Values
Background Concentration	24 hours	0,767	582368	7672359	50	125	40	1,53%	0,61%	1,92%
	Annual	0,1470	582368	7672359	30	-	-	0,49%	-	-
Concentration Worst Case for the Company	24 hours	11,00	582232	7672309	50	125	40	22,01%	8,80%	27,51%
	Annual	1,94	582232	7672309	30	-	-	6,47%	-	-
Background Concentration + Worst Case Concentration of the Company	24 hours	11,77	-	-	50	125	40	23,54%	9,42%	29,43%
	Annual	2,09	-	-	30	-	-	6,96%	-	-

Source: Author

Maximum Concentration in Receptors

Five receivers were identified around the project, and it is observed that in none of them the limits established by CONAMA Resolution No. 506/2024 or by the WHO guide values were exceeded, both for the 24-hour standards and for the annual average. This conclusion holds even considering the combined scenario, i.e., the sum of the background concentration with the estimated maximum contribution of the project.

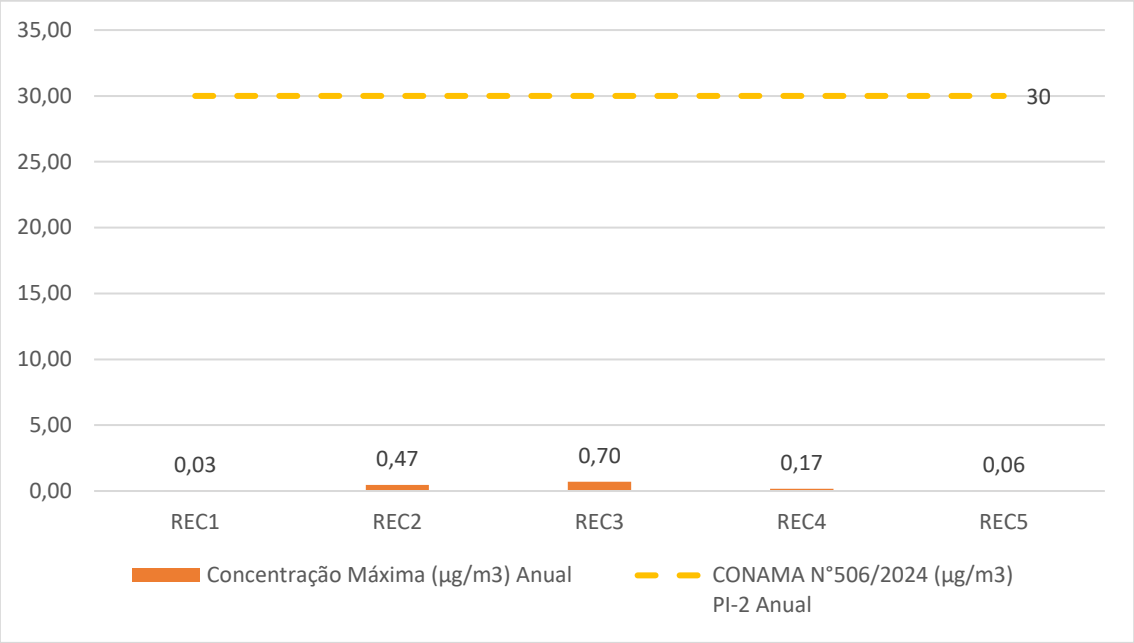
INSERTION 6-34 - Maximum Concentration in SO2 Receptors

Scenario	Average Time	Max. Concentration (µg/m3)					CONAMA N°506/2024	WHO (2021)	
		REC1	REC2	REC3	REC4	REC5		MI-1	Final Guide Values
Background Concentration	24 hours	0,767	0,767	0,767	0,767	0,767	50	125	40
	Annual	0,1470	0,1470	0,1470	0,1470	0,1470	17	-	-
Concentration Worst Case for the Company	24 hours	0,53	3,43	5,25	3,97	0,91	50	125	40
	Annual	0,03	0,47	0,70	0,17	0,06	17	-	-
Background Concentration + Worst Case Concentration of the Company	24 hours	1,29	4,20	6,02	4,73	1,68	50	125	40
	Annual	0,17	0,62	0,85	0,32	0,20	17	-	-

Source: Author

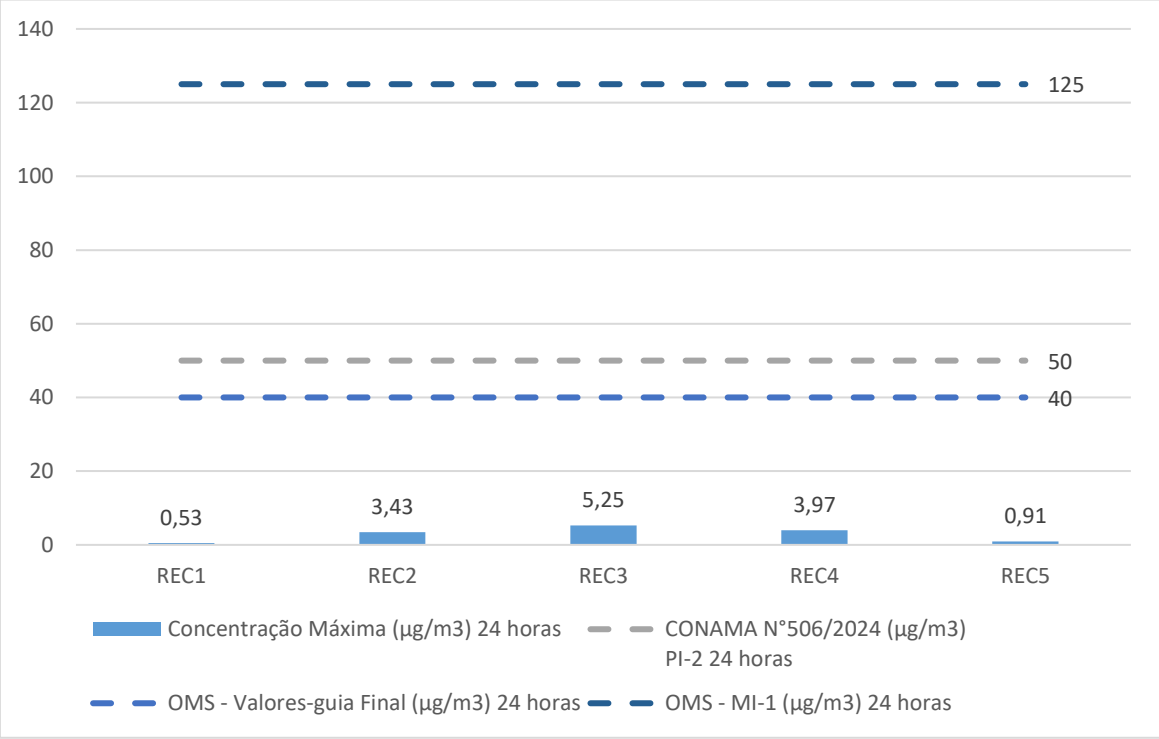
In the insertions below, the results are observed in graphic representation, comparing with the legal limit(s).

INSERTION 6-35 - Results in Receptors for 24h SO2 Concentrations



Source: Author

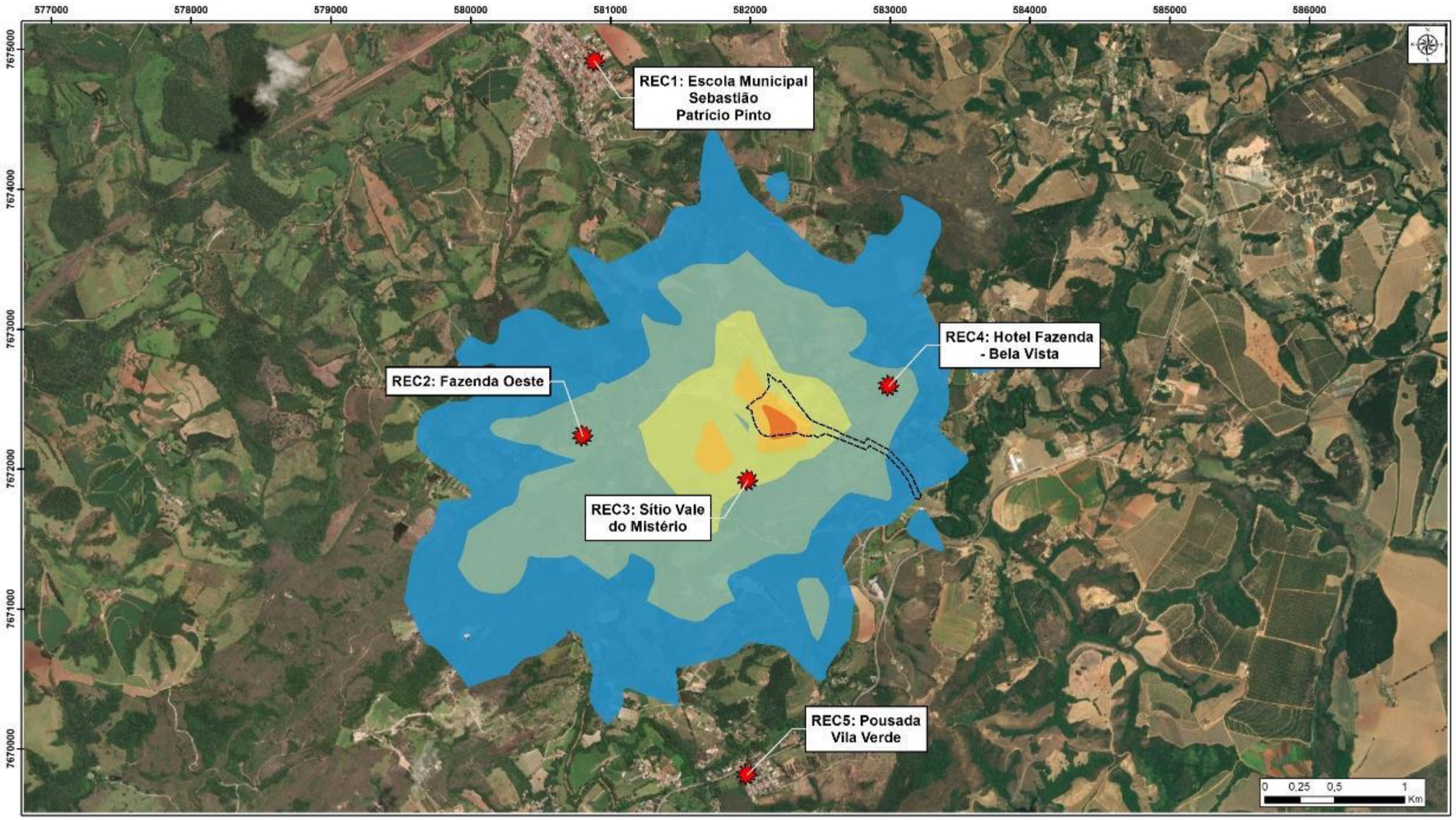
INSERTION 6-36 - Results in Receptors for Annual SO2 Concentrations



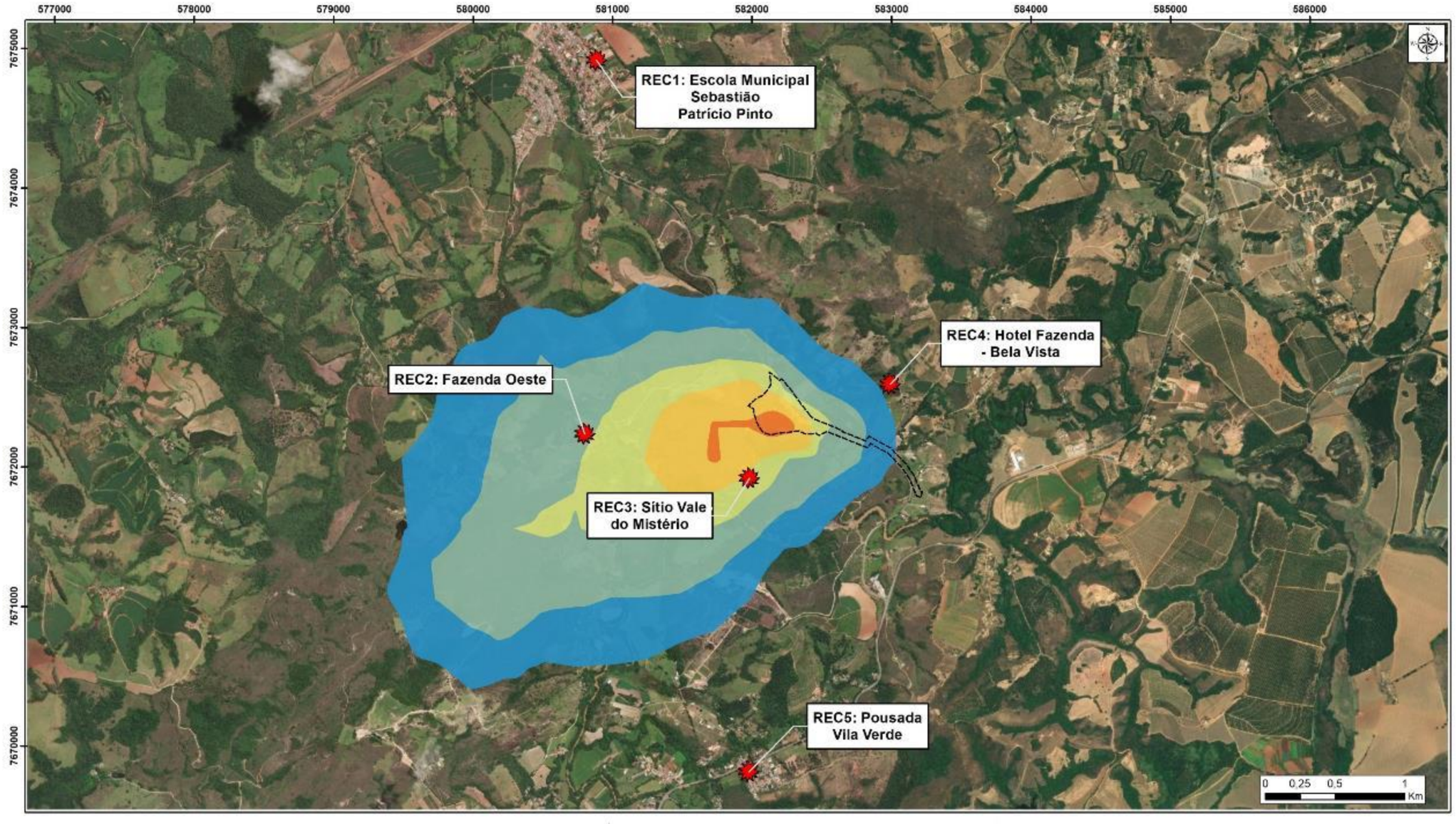
Source: Author

The following insertions show the pollutant dispersion plumes for the short-term (24h) and long-term (annual) periods, respectively.

INSERTION 6-37 - Concentration Isolines - SO2 (Maximum 24 h)



INSERTION 6-38 - Concentration Isolines - SO2 (Annual Average)



LEGENDA

- Receptores
- Área Diretamente Afetada - ADA

Dispersão atmosférica - SO2 Anual

- 0,2 - 0,3
- 0,3 - 0,5
- 0,5 - 0,8
- 0,8 - 1,5
- 1,5 - 1,91
- > 1,91

LOCALIZAÇÃO

BRANDT Meio Ambiente

Cliente: BOSTON ELECTROMETALLURGICAL CORPORATION BRASIL LTDA

Projeto: ESTUDO DE DISPERSÃO ATMOSFÉRICA - EDA

Título: PLUMA DE DISPERSÃO ATMOSFÉRICA - SO2 ANUAL

Execução / Data:	Escala Aprox.:	Formato/ Orientação:	Dados Técnicos:
Vinicius Minelli / 20.05.25	1:25.000	A3/ Horizontal	Projeção UTM - SIRGAS2000 Meridiano Central: -45 WGR
Revisão / Data: Brenda Ribeiro / 20.05.25			

Fontes: Pluma: Brandt (2025). Demais dados fornecidos pelo cliente

Arquivo:

7 STACK HEIGHTS

Considering the height of the projected stack and the empirical criteria established in the IFC's Environmental, Health, and Safety Guidelines – Air Emissions and Ambient Air Quality, which recommends, as a good practice, that the stack rises at least to the height of the nearest building plus 1.5 times its smallest horizontal dimension, it is essential to note that this guideline is indicative and aims to, above all, to ensure minimum conditions of atmospheric dispersion in the absence of more in-depth technical analyses.

In the present case of Boston Metal Brasil, a technical approach was adopted based on the best techniques of environmental control engineering, associated with air quality assessment instruments and meteorological analysis, which allowed to safely conclude that the height of the stack does not compromise the efficiency of the dispersion system or the surrounding air quality standards. The project incorporates high-efficiency atmospheric emission control systems, classified as Best Available Techniques (BAT), which ensure the emission of pollutants at levels much lower than the limits established by current environmental legislation and in accordance with what is requested by the IFC, including periodic monitoring of emissions and preventive maintenance programs that ensure the stability and operational reliability of the emitting units.

Additionally, atmospheric dispersion modeling was performed based on internationally recognized tools (such as the AERMOD model), using historical series of meteorological data representative of the region. The results demonstrate that the maximum concentration levels of primary pollutants remain significantly below the air quality standards provided for in CONAMA Resolution No. 506/2024, even in less favorable weather conditions. This is largely due to the location of the project and the prevailing wind regime in the project's area of influence, which promotes the removal of pollutants from nearby buildings and sensitive areas. The predominant direction of the winds contributes to the efficient dispersion of the pollutants emitted. Also, the topography of the terrain does not present obstacles that limit the movement of air or create areas of recirculation or stagnation. The frequency and intensity of atmospheric stability conditions are low, which reinforces the robustness of the local dispersion regime.

Thus, it is concluded that the set of control measures adopted, the topographic conditions and local meteorological conditions added to the technical verification by modeling, guarantees an environmental performance. The effectiveness of the atmospheric control system is ensured by the controls applied by Boston Metal do Brasil.

8 CONCLUSION

The Atmospheric Dispersion Study (EDA) was conducted through the application of the AERMOD regulatory model, version 12.0.0, with the objective of simulating the dispersion of atmospheric pollutants generated by the operations of the company Boston Metal do Brasil.

The operational unit is composed of point and diffuse emission sources. The estimate of atmospheric emissions was carried out based on widely recognized methodologies, such as the emission factors of the United States Environmental Protection Agency (EPA – AP-42), the National Pollutant Inventory (NPI – Australia) and the State Foundation for the Environment (FEAM – Brazil). The production information used in the estimates was provided by Boston Metal do Brasil itself.

The air quality assessment, carried out through atmospheric dispersion modeling, demonstrated that the predicted concentrations exclusively attributed to the company's contribution to the analyzed pollutants (PTS, PM_{10}, $PM_{2.5}$, SO_2, CO, and NO_2) remain well below the limits established by CONAMA Resolution No. 506/2024 and the WHO guidelines, at external receptor points representative of the potentially exposed population.

Thus, it is concluded that the isolated contribution of the project is considered insignificant for the degradation of air quality, including at locations with the highest expected population exposure. The emissions observed do not pose any risk to public health or the environment, provided that the proposed operational and environmental control measures are properly implemented and maintained.

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