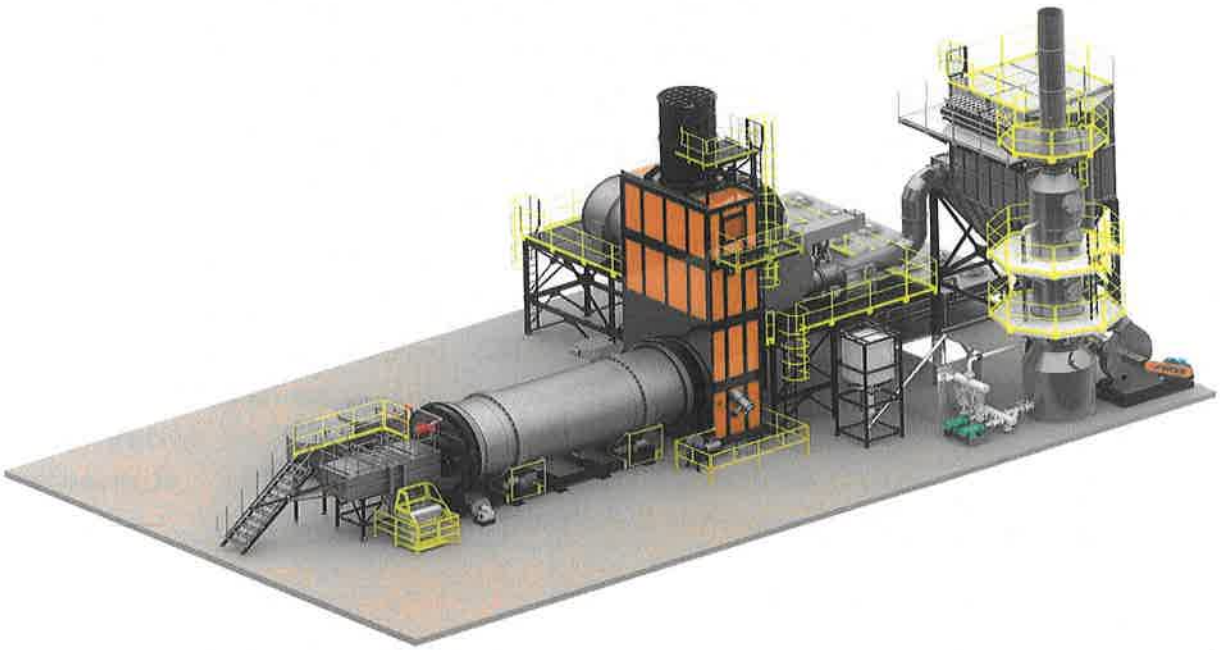
REPORT ON THE ENVIRONMENTAL IMPACT

REV. 2



PROJECT: **CONSTRUCTION OF HALL BUILDING, CONCRETE DRAINABLE BASIN, CONCRETE PLATFORMS, FENCING, LIGHTING SYSTEM, DRILLING AND INTERNAL NETWORK FOR WATER SUPPLY AND SEWERAGE, INSTALLATION OF WASTE WATER TREATMENT PLANT, INSTALLATION OF MEDICAL WASTE INCINERATOR WITH ANNEXED FACILITIES**

SITE: **GIURGIU MUNICIPALITY, SLOBOZIEI ROAD, KM. 4, LOT 2, GIURGIU COUNTY**

HOLDER: **SC FRIENDLY WASTE ROMANIA SRL**

DRAFTED BY: **FECHETE VOLODEA - RIM**
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Name of the study:	**REPORT ON THE ENVIRONMENTAL IMPACT**
Project:	**CONSTRUCTION OF HALL BUILDING, CONCRETE DRAINABLE BASIN, CONCRETE PLATFORMS, FENCING, LIGHTING SYSTEM, DRILLING AND INTERNAL NETWORK FOR WATER SUPPLY AND SEWERAGE, INSTALLATION OF WASTE WATER TREATMENT PLANT, INSTALLATION OF MEDICAL WASTE INCINERATOR WITH ANNEXED FACILITIES**
Location:	**GIURGIU MUNICIPALITY, SLOBOZIEI ROAD, KM. 4, LOT 2, GIURGIU COUNTY**
Holder:	**SC FRIENDLY WASTE ROMANIA SRL**
Drafted by:	**FECHETE VOLODEA - RIM** **SAVIN OANA - EA**
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SEPTEMBER 2023

Table of contents

1. GENERAL 10
1.1. GENERAL FRAMEWORK 10
1.2. INFORMATION ABOUT THE PROJECT HOLDER 10
1.3. INFORMATION ON THE REGISTERED AUTHOR OF THE ENVIRONMENTAL IMPACT REPORT 10
2. DESCRIPTION OF THE PROJECT 11
2.1. PROJECT LOCATION 12
2.2. THE PHYSICAL CHARACTERISTICS OF THE WHOLE PROJECT 16
2.3. THE MAIN FEATURES OF THE PROJECT OPERATIONAL PHASE 20
2.4. ESTIMATION, BY TYPE AND QUANTITY, OF EXPECTED WASTE AND EMISSIONS 49
2.4.1. WATER POLLUTION 49
2.4.2. AIR POLLUTION 51
2.4.3. SOIL AND SUBSOIL POLLUTION 52
2.4.4. NOISE AND VIBRATIONS 53
2.4.5. LIGHT, HEAT, RADIATION 53
2.4.6. QUANTITIES AND TYPES OF WASTE PRODUCED DURING THE CONSTRUCTION AND OPERATION PHASES 53
2.5. Rules for waste incineration 57
3. DESCRIPTION OF FEASIBLE ALTERNATIVES 58
4. DESCRIPTION OF RELEVANT ASPECTS OF THE CURRENT STATE OF THE ENVIRONMENT 59
4.1. ASPECTS OF THE CURRENT STATE OF THE ENVIRONMENT 59
4.2. DATA COLLECTION AND METHODS OF CONDUCTING INVESTIGATIONS 74
5. DESCRIPTION OF RELEVANT ENVIRONMENTAL FACTORS LIKELY TO BE AFFECTED BY THE PROJECT 75
5.1. POPULATION AND HUMAN HEALTH 75
5.2. BIODIVERSITY 80
5.3. LANDS AND SOIL 81
5.4. WATER 82
5.5. AIR AND CLIMATE 83
5.6. MATERIAL GOODS 96
5.7. CULTURAL HERITAGE 96
5.8. LANDSCAPE 97
6. DESCRIPTION OF THE SIGNIFICANT ENVIRONMENTAL EFFECTS THAT THE PROJECT MAY HAVE 98
7. DESCRIPTION OR EVIDENCE OF FORECASTING METHODS USED TO IDENTIFY AND ASSESS SIGNIFICANT ENVIRONMENTAL EFFECTS 196
8. DESCRIPTION OF THE MEASURES ENVISAGED TO AVOID, PREVENT, REDUCE OR OFFSET ANY IDENTIFIED SIGNIFICANT ADVERSE ENVIRONMENTAL EFFECTS 196
9. DESCRIPTION OF ANY PROPOSED FOLLOW-UP MEASURES 207
10. A DESCRIPTION OF THE EXPECTED SIGNIFICANT ADVERSE ENVIRONMENTAL EFFECTS OF THE PROJECT RESULTING FROM THE VULNERABILITY OF PROJECT TO

MAJOR ACCIDENT AND/OR DISASTER RISKS RELEVANT TO THE PROJECT IN QUESTION 208
11. BAT 209
12. NON-TECHNICAL SUMMARY OF THE INFORMATION PROVIDED 244
13. REFERENCE LIST 250
14. ANNEXES 252

Index of tables

Table 1 - Stereo 70 coordinates of the site 12
Table 2 - Incinerator emission parameters 20
Table 3 - Technical characteristics of the burners 24
Table 4 - Types of **non-hazardous medical waste** to be incinerated in the incineration plant 34
Table 5 - Types of **hazardous medical waste** to be incinerated in the incineration plant 35
Table 6 - Types of **non-hazardous waste** to be incinerated in the incineration plant 35
Table 7: Characteristics of the types of hazardous waste to be incinerated in the analyzed incinerator .. 38
Table 8 - Information on production and resources used 49
Table 9 - Average experimental wastewater composition for the construction period 49
Table 10 - Domestic waste water load related to staff during the period of operation 50
Table 11: Estimated loadings to process water during the operational period of the objective 51
Table 12 - Estimated quantities of waste resulting from the construction phase 54
Table 13 - Waste generated in the exploitation phase 55
Table 14 - Diesel emission factors 84
Table 15 - Pollutant mass flow rates (g/h) 84
Table 16 - Pollutant mass flow rates (kg) 84
Table 17 - Pollutant mass flow rates 88
Table 18 - Average Emissions and EU Standards of Base Incinerators (with secondary compartment). 89
Table 19 - LPG emission factors 89
Table 20 - Emissions from stationary sources of controlled pollution 89
Table 21 - Mass flow rates and concentrations of pollutants emitted to the atmosphere during operation under load without additional air supply 90
Table 22 - Mass flow rates and concentrations of pollutants emitted to the atmosphere during load operation with supplementary air supply 91
Table 23 - Pollutants emitted into the atmosphere from incinerator operation 92
Table 24 - pollutants emitted into the atmosphere from the operation of the incinerator with a waste burning rate of 300 kg/h 93
Table 25 - Emission factors 94
Table 26 - Mobile emission sources 95
Table 27 - Mass flow rates and concentrations of pollutants emitted to the atmosphere during operation under load without additional air supply 98
Table 28 - Mass flow rates and concentrations of pollutants emitted to the atmosphere during load operation with supplementary air supply 98
Table 29 - Pollutant mass flow rates - stationary directed pollution sources 99
Table 30 - Pollutant mass flows - mobile pollution sources 99
Table 31 - Emission credit ratings - incinerator without additional air supply 99
Table 32 - Emission credit notes - incinerator with supplementary air supply 100
Table 33 - Credit ratings for immissions - incinerator 100

Table 34 - Credit ratings for the environmental factor air without additional air input to the incinerator combustion system 101
Table 35 - Credit ratings for the environmental factor air with additional air input to the incinerator combustion system 101
Table 36 - Credit ratings for the environmental factor air at the border with Bulgaria 101
Table 37 - Estimated noise level 102
Table 38 - Noise Goodness Ratings 102
Table 39 - Noise goodness credit ratings 102
Table 40 - Environmental factor goodness credit ratings for human settlements 103
Table 41 - Environmental factor goodness notes for human settlements at the border with Bulgaria ... 103
Table 42 - Impact assessment matrix 103
Table 43 - Credit ratings for the environmental factor soil - subsoil 104
Table 44 - Impact assessment matrix 104
Table 45 - Credit ratings for the environmental factor soil - subsoil 104
Table 46 - Rating scale 106
Table 47 - IPG diagram parameters without additional air supply to the combustion system 107
Table 48 - IPG diagram parameters with additional air supply to the combustion system 108
Table 49 - IPG diagram parameters at the border with Bulgaria 109
Table 50 - Ip value 110
Table 51 - Assessment of the state of environmental damage according to the Ic value 110
Table 52 - Pollution index goodness scale 110
Table 53 - Quality index goodness scale 111
Table 54 - Concentrations and mass flow rates of treated wastewater pollutants discharged from the sewage lagoon compared to NTPA 002/2005 112
Table 55 - Estimated concentrations and mass flows of rainwater pollutants discharged from platforms compared to NTPA 001/2005 112
Table 56 - Credit ratings awarded 113
Table 57 - Maximum emission concentrations from the incinerator in relation to the regulated limits. 114
Table 58 - Maximum concentrations in immission generated by the operation of engines of vehicles and machinery participating in construction activities 115
Table 59 - Calculated physical parameters for soft modelling input with additional air supply 121
Table 60 - Calculated physical parameters for soft modeling input without additional air supply 122
Table 61 - Stationary emission source coordinates 123
Table 62 - Variation of CO concentration in relation to distance from the emission point 169
Table 63 - Variation of NOx concentration with distance from the emission point 170
Table 64 - Variation of SO_2 concentration in relation to distance from the emission point 171
Table 65 - Variation of TSP concentration in relation to distance from the emission point 172
Table 66 - Variation of HCl concentration in relation to distance from emission point 173
Table 67 - Variation of HF concentration versus distance from emission point 174
Table 68 - Variation of TOC concentration in relation to distance from emission point 175
Table 69 - Variation of PCDD & PCDF concentration in relation to distance from emission point **(values in µg/mc x 10^{-6})** 176
Table 70 - Variation of PCDD & PCDF concentration in relation to distance from the emission point (values in pg I.TEQ/Nmc) 177
Table 71 - Maximum values of pollutants emitted into the atmosphere from incinerators with secondary combustion chamber 178
Table 72 - Half-hourly average emission limit values (mg/Nmc) 180
Table 73 - Daily average emission peak values 180
Table 74 - Sulphur dioxide (SO2) 182
Table 75 - Nitrogen oxides (NOx) 182

Table 76 - Carbon monoxide (CO) 182
Table 77 - Variation of CO concentration in relation to distance from the emission point 185
Table 78 - Variation of NO_2 concentration in relation to distance from the emission point 185
Table 79 - Variation of SO concentration in relation to distance from the emission point 186
Table 80 - Variation of TSP concentration in relation to distance from the emission point 186
Table 81 - Variation of HCl concentration in relation to distance from emission point 187
Table 82 - Variation of HF concentration versus distance from emission point 190
Table 83 - Variation of TOC concentration in relation to distance from emission point 193
Table 84 - Variation of PCDD & PCDF concentration in relation to distance from emission point **(values in µg/mc x 10^{-6})** 193
Table 85 - Variation of PCDD & PCDF concentration in relation to distance from the emission point (values in pg I.TEQ/Nmc) 194
Table 86: concentration values in immission at Ruse city boundary 194
Table 87 - Permissible noise limits near protected buildings 197
Table 88 - Average annual wind and calm frequency (%) at Giurgiu weather station 200
Table 89 - Average monthly and annual wind speed (m/s) at Giurgiu weather station 200
Table 90 - Variation of CO concentration in relation to distance from the emission point 203
Table 91 - Variation of NOx concentration with distance from the emission point 203
Table 92 - Variation of SO concentration in relation to distance from the emission point 203
Table 93 - Variation of TSP concentration in relation to distance from the emission point 204
Table 94 - Variation of HCl concentration in relation to distance from emission point 204
Table 95 - Variation of HF concentration versus distance from emission point 205
Table 96 - Variation of TOC concentration in relation to distance from emission point 205
Table 97 - Variation of PCDD & PCDF concentration in relation to distance from emission point (values in µg/mc x 10--6) 206
Table 98 - Variation of PCDD & PCDF concentration in relation to distance from the emission point (values in pg I.TEQ/Nmc) 206
Table 99 - monitoring of key process parameters relevant for emissions to air and water 212
Table 100 - Monitoring of airborne emissions 212
Table 101 - Activity monitoring according to BAT 7 214
Table 102 - techniques applied to improve the overall environmental performance and efficiency of the combustion process 215
Table 103 - Monitoring elements at waste reception 216
Table 104 - Techniques applied to reduce environmental risks associated with waste reception, handling and storage 217
Table 105 - Combinations of techniques to reduce the environmental risk associated with the storage and handling of medical waste 217
Table 106 - Techniques used to improve the overall environmental performance of waste incineration 218
Table 107 - BAT-related environmental performance levels for non-aqueous substances in slags and bottom ash from waste incineration 218
Table 108 - Techniques to increase the energy efficiency of incineration plants 219
Table 109 - techniques to prevent or reduce diffuse airborne powder emissions from slag and bottom ash treatment 222
Table 110 - Techniques indicated by BAT to reduce airborne emissions of dust, metals and metalloids from waste incineration 224
Table 111 - BAT related emission levels BAT (BAT-AEL) for airborne emissions of powders, metals and metalloids 225
Table 112 - BAT (BAT-AELs) for airborne emissions of dust from slag and bottom ash treatment in closed equipment with air extraction 226

Table 113 - techniques indicated to reduce the release of HCl, HF and SO2 to air from waste incineration 227
Table 114 - techniques used to reduce peak levels of HCl, HF and SO2 airborne emissions from waste incineration while limiting reagent consumption and the amount of residues generated from adsorbent injection..... 228
Table 115 - BAT (BAT-AELs) - related emission levels for the airborne emissions of HCl, HF and SO2 from waste incineration..... 228
Table 116 - BAT techniques suitable for reducing NOX air emissions while limiting CO and N2O emissions from waste incineration and NH3 emissions from RNCS and/or RCS use 229
Table 117 - BAT (BAT-AELs) related emission levels for NOX and CO emissions to air from..... 230
Table 118 - BAT techniques used to reduce airborne emissions of organic compounds - including PCDD/F and PCBs - from waste incineration 230
Table 119 - BAT (BAT-AELs) related emission levels for dioxin-like TCOV, PCDD/F and PCB emissions to air from waste incineration 232
Table 120 - BAT techniques to reduce airborne mercury emissions (including peak levels of mercury emissions) from waste incineration 233
Table 121 - BAT (BAT-AELs) related emission levels for mercury emissions to air from 235
Table 122 - BAT techniques to reduce water use and prevent or reduce wastewater generation from the 236
Table 123 - BAT techniques for reducing emissions to water from flue gas cleaning and/or slag and bottom ash storage and treatment..... 237
Table 124 - : BAT-AEL values for direct emissions to a receiving water body..... 237
Table 125 - BAT-AEL values for indirect emissions in a receiving water body 238
Table 126 - BAT techniques to increase resource use efficiency in treating slag and bottom ash..... 238
Table 127 - Applicable BAT techniques to prevent or, if not possible, reduce noise emissions 239
Table 128 - general BAT techniques used for waste incineration activity 240
Table 129 - general BAT techniques used to reduce air emissions from waste incineration activity 240
Table 130 - general BAT techniques used to reduce emissions to water from waste incineration activity 242
Table 131 - BAT management techniques used for waste incineration activity 243

Index of figures

Figure 1 - Project location (Source: Google Earth) 12
Figure 2 - Stereo 70 coordinate points of the site 13
Figure 3 - Location of land in Sub-area I1 and neighboring sub-areas 15
Figure 4 - View from the ground to the North - Sub-area I3 (ZIROM SA) 16
Figure 5 - Incinerator overview 21
Figure 6 - Layout of the location of the incinerator components with the gauge dimensions..... 22
Figure 7 - Features of the P 61 burner gauge..... 24
Figure 8 - P61 burner performance curve for LPG fuel..... 25
Figure 9 - Installation gas pressure/gas flow curves..... 25
Figure 10 - Non-hazardous waste stream..... 30
Figure 11 - Non-hazardous animal waste stream..... 31
Figure 12 - Medical waste stream..... 33
Figure 13 - Schematic diagram of technological objects operating the wastewater treatment plant..... 46
Figure 14 - Diagram of processes of wastewater treatment plant..... 47
Figure 15 - Modeling annual variation for temperature and precipitation..... 60

Figure 16 - Modeling annual variation in sunshine and nebulae 61
Figure 17 - Modelling annual variation in maximum and minimum temperatures 61
Figure 18 - Modelling the annual variation of precipitation amounts 62
Figure 19 - Wind speed variation recorded at 1km from Giurgiu 62
Figure 20 - Modelling annual wind speed variation 63
Figure 21 - The dew of the winds 63
Figure 22 - Soil types in the study area (Source: atlas.anpm.ro) 66
Figure 23 - Location of the project - Geological Map of Romania (Source: geo-spatial.org by accessing Google Earth) 68
Figure 24 - Legend of the Geological Map of Romania, scale 1:200.000, available on geo-spatial.org website 69
Figure 25 - Physical map of Giurgiu county 70
Figure 26 - Location of the project in relation to human settlements (Source: Google Earth) 76
Figure 27 - Housing area located in the south-east in relation to the project site 77
Figure 28 - Distance between target and nearest surface water 82
Figure 29 - Distance between the site and the nearest historical monument 96
Figure 30 - Location of the project in relation to Giurgiu Municipality (Source: Google Earth) 97
Figure 31 - Global pollution index - calculation 105
Figure 32 - IPG diagram without additional air supply to the combustion system 107
Figure 33 - IPG diagram with additional air supply to the combustion system 108
Figure 34 - IPG diagram at the border with Bulgaria 109
Figure 35 - Modelling of wind speed variation in relation to prevailing directions for March 2022 120
Figure 36 - Modelling of wind speed variation in relation to prevailing directions for March 2022 120
Figure 37 - Modelling of the variation of mean temperatures in relation to humidity variation for March 2022 120
Figure 38 - Location of stationary emission sources 124
Figure 39 - Incinerator location 124
Figure 40 - NOx dispersion modelling - 1 h averaging period 125
Figure 41 - NOx dispersion modelling - 1 h averaging period (detail) 126
Figure 42 - NOx dispersion modelling - 24 h averaging period 127
Figure 43 - NOx dispersion modelling - 24 h averaging period (detail) 128
Figure 44 - NOx dispersion modelling - averaging period 1 year 129
Figure 45 - NOx dispersion modelling - averaging period 1 year (detail) 130
Figure 46 - CO dispersion modelling - 8 h averaging period 131
Figure 47 - CO dispersion modelling - 8 h averaging period (detail) 132
Figure 48 - CO dispersion modelling - 24 h averaging period 133
Figure 49 - CO dispersion modelling - 24 h averaging period (detail) 134
Figure 50 - CO dispersion modelling - averaging period 1 year 135
Figure 51 - CO dispersion modelling - averaging period 1 year (detail) 136
Figure 52 - TOC dispersion modelling - 1 h averaging period 137
Figure 53 - TSP dispersion modelling - averaging period 1 h (detail) 138
Figure 54 - TSP dispersion modelling - averaging period 1 day 139
Figure 55 - TSP dispersion modelling - averaging period 1 day (detail) 140
Figure 56 - TSP dispersion modelling - averaging period 1 year 141
Figure 57 - TSP dispersion modelling - averaging period 1 year (detail) 142
Figure 58 - SO2 dispersion modelling - 1h averaging period 143
Figure 59 - SO2 dispersion modelling - averaging period 1 h (detail) 144
Figure 60 - SO2 dispersion modelling - 24 h averaging period 145
Figure 61 - SO2 dispersion modelling - 24 h averaging period (detail) 146
Figure 62 - SO2 dispersion modelling - averaging period 1 year 147

Figure 63 - SO2 dispersion modelling - averaging period 1 year (detail) 148
Figure 64 - HCl dispersion modelling - averaging period 30 minutes 149
Figure 65 - HCl dispersion modelling - averaging period 30 minutes (detail) 150
Figure 66 - HCl dispersion modelling - averaging period 24 h 151
Figure 67 - HCl dispersion modelling - averaging period 24 h (detail) 152
Figure 68 - HF dispersion modelling - averaging period 30 minutes 153
Figure 69 - HF dispersion modelling - averaging period 30 minutes (detail) 154
Figure 70 - TOC dispersion modelling - 24 h averaging period 155
Figure 71 - HF dispersion modelling - 24 h averaging period (detail) 156
Figure 72 - TOC dispersion modelling - averaging period 30 minutes 157
Figure 73 - TOC dispersion modelling - averaging period 30 minutes (detail) 158
Figure 74 - TOC dispersion modelling - 24 h averaging period 159
Figure 75 - TOC dispersion modelling - 24 h averaging period (detail) 160
Figure 76 - Soft message from the dioxin and furan concentration dispersion modelling test in immissions 161
Figure 77 - Modelling of dioxin and furan concentration dispersion in immissions - 1 h averaging period 162
Figure 78 - Modelling of dioxin and furan concentration dispersion in immissions - 1 h averaging period (detail) 163
Figure 79 - Modelling of dioxin and furan concentration dispersion in immissions - 8 h averaging period 164
Figure 80 - Modelling of dioxin and furan concentration dispersion in immissions - 8 h averaging period (detail) 165
Figure 81 - Modelling of dioxin and furan concentration dispersion in immissions - 24 h averaging period 166
Figure 82 - Modelling of dioxin and furan concentration dispersion in immissions - 24 h averaging period (detail) 167
Figure 83 - Modelling of dioxin and furan concentration dispersion in immissions - averaging period 1 year 168
Figure 84 - Diagram representing wind direction and frequency 200

1. GENERAL

1.1. GENERAL FRAMEWORK

This study was prepared at the request of the competent environmental authority (Giurgiu Environmental Protection Agency) in the procedure for obtaining environmental consent for the project proposed by FRIENDLY WASTE ROMANIA SRL, namely: "CONSTRUCTION OF HALL BUILDING, CONCRETE DRAINABLE BASIN, CONCRETE PLATFORMS, FENCING, LIGHTING SYSTEM, DRILLING AND INTERNAL NETWORK FOR WATER SUPPLY AND SEWERAGE, INSTALLATION OF WASTE WATER TREATMENT PLANT, INSTALLATION OF MEDICAL WASTE INCINERATOR WITH ANNEXED FACILITIES".

The paper was prepared in accordance with Annex No. 4 of Law No. 292/2018 on the assessment of the environmental impact of certain public and private projects and the Methodological Guide for the preparation of the environmental impact report in Annex 1 - Guide applicable to the stages of the environmental impact assessment procedure, approved by Order of the Minister of the Environment, Water and Forests No. 269/2020.

The study was also prepared in compliance with the guidelines for the preparation of the environmental impact report sent to the project holder by Giurgiu Environmental Protection Agency letter no. 1785/1480/2021/S.A.A.A./27.02.2023, following the field defining phase.

Environmental impact assessment is the process of identifying, describing and establishing, on a case-by-case basis and in accordance with applicable law, the direct and indirect, synergistic, cumulative, primary and secondary effects of a project on human health and the environment.

The project proposed by the holder - FRIENDLY WASTE ROMÂNIA SRL is included in Annex no. 1 - *List of projects subject to environmental impact assessment* of Law no. 292/2018, point 9: "Hazardous waste landfills or facilities for the disposal of hazardous waste by incineration or chemical treatment, as defined in Annex No. 2 to Law No. 211/2011 on the waste regime, republished, with further amendments and completions" and it is necessary to go through the environmental impact assessment procedure, with the preparation of the environmental impact report (RIM).

1.2. INFORMATION ABOUT THE PROJECT HOLDER

- ***Name:*** **SC FRIENDLY WASTE ROMANIA SRL**
- ***Postal address (head office):*** Bucharest Sector 2, Corneliu Botez Street, no. 10, building F, ground floor, office no. 1, Apt. 1
- ***Project location:*** municipality of Giurgiu, Sloboziei road, km. 4, LOT 2, Giurgiu County
- ***Phone number and e-mail address***: tel: 0720060444; office@friendlywaste.ro
- ***Name of contact person:*** FADEL MOHAMAD

1.3. INFORMATION ON THE REGISTERED AUTHOR OF THE ENVIRONMENTAL IMPACT REPORT

- **RIM elaborator**: This environmental impact report has been prepared by **Volodea FECHETE**, a certified main level expert with Certificate of Attestation series RGX, no. 485/02.03.2023 issued by the Romanian Environmental Association 1998, for the preparation of the following environmental studies: RIM-2, RIM-3, RIM-6, RIM-8, RIM11b, RA-3, RA7, RA-8,RA-10, RA-11b, RM-13b, RS-1, RS-7, BM-2, BM-6, BM-7, MR-11b, EGZA.

The project analyzed in this study falls under study type RIM-11b) Waste management infrastructure.

- ***Address:*** Focsani locality, str. Carabus, no. 19A, Vrancea County
- ***Phone number and e-mail address***: tel: 0727 878 441; e-mail: volodea.fechete@divori.ro

- **EA elaborator**: In accordance with the provisions of Article 15 para. (7) of Annex 5 to Law no. 292/2018, the non-technical summary of the information provided in the environmental impact report includes the conclusions of the appropriate assessment study, prepared by **Oana SAVIN**, certified expert - main level, holding the Certificate of Attestation series RGX, no. 450/25.01.2023 issued by the Romanian Environmental Association
- ***Address:*** Focsani locality, str. Horia, Closca si Crisan, no. 4, Vrancea county;
- ***Phone number and e-mail address***: tel: 0756 039 802; e-mail: oana.savin@divori.ro

The certificates of attestation mentioned above are attached.

2. DESCRIPTION OF THE PROJECT

The project proposed by the holder consists in the construction of a metal structure hall and the purchase and installation of a rotary incinerator for the incineration of medical and animal waste, in order to develop new incineration capacities for the geographical area comprising Giurgiu County and neighbouring counties, by equipping it with high performance equipment complying with the highest standards and technologies for environmental protection, with the reduction of waste transport distances between generators and processors.

Thermal waste treatment processes are a feasible option after recovery options (collection, sorting, recycling) and before controlled landfilling. Oxidation at high temperatures converts organic components into specific gaseous oxides, which are mainly carbon dioxide and water. The inorganic components are mineralized and transformed into ash.

The general purpose of waste incineration is:

1. minimizing the potential for risk and pollution;
2. reducing the amount and volume of waste;
3. conversion of the remaining substances into a form that allows their recovery or storage;
4. transformation and recovery of the energy produced.

The works to be carried out for the implementation of the project, ensuring a technological flow in accordance with the legal provisions but also ensuring operation at maximum performance in terms of protection of environmental factors, will consist of:

→ construction of a hall made of coated sheet metal panels placed on a metal structure
→ purchase and installation in the technological flow of a waste incinerator type IE 1000R-300
→ purchase and installation in the technological flow of 2 cold rooms with V = 16 m3 each
→ purchase and installation of a weighing platform
→ purchase and installation
→ of a mobile scale for 1 t
→ purchase and installation in the technological flow of 4 LPG tanks of 5000 l each
→ construction of concrete platforms
→ installation of a basin with V = 10 m3
→ construction of water supply and sewage networks
→ making a connection to the district drinking water network
→ making a connection to the local sewerage network.

The implementation of the proposed project will increase the waste incineration capacity and diversify the activity of company by incinerating both non-hazardous waste and a broad category of hazardous waste.

2.1. PROJECT LOCATION

The administrative location of the site of the project under analysis is in the incorporated area of Giurgiu municipality, Sloboziei road, km 4, lot 2, Giurgiu county.

Figure 1 - Project location (Source: Google Earth)

The land proposed for the implementation of the project is located in Platform 2 of the former Giurgiu Chemical Combine.

The Stereo 70 coordinates of the project site are highlighted in the table below (Table 1) and Figure 2:

Table 1 - Stereo 70 coordinates of the site

Point determination	System degrees, minutes, seconds		STERO 70 System	
	Latitude	Longitude	Latitude (N)	Longitude (E)
1	43°53'13.28 N	25°55'56.53"E	265677.891	575049.227
2	43°53'10.73"N	25°55'59.13"E	265599.852	575108.173
3	43°53'9.68"N	25°55'57.28"E	265566.969	575067.248
4	43°53'12.20"N	25°55'54.76"E	265644.103	575010.099

Figure 2 - Stereo 70 coordinate points of the site

The land under consideration, with an area of 3050.00 sqm, is classified as a building yard, production area, C.U.T. = 2.4 sqm ADC/sqm land and P.O.T. = 60%. It is a land located in zone "C" according to HCLM no. 173/2007. No changes to the current use regime are foreseen.

The land under analysis is located in the incorporated area of Giurgiu municipality, belonging to the private domain of the legal entity SC FRIENDLY WASTE ROMANIA SRL according to the Notarial Act no. 250 of 22.02.2021 issued by BIN Ciobanu Dinei Victor with the following characteristics:

- is not encumbered
- is not located in a protected area
- there are no building bans

The land remains with the same owner throughout the execution of works and after the execution of works.

According to the updated General Urban Plan of Giurgiu Municipality, approved by the Decision of the Local Council of Giurgiu Municipality no. 37/2011, extended by the Decision of the Local Council of Giurgiu Municipality no. 89/2021, the land is located in **sub-area I1 - Production, storage area.** The area is intended for buildings with a maximum of 3+3 levels and a maximum height of 20.0 m (except for machine accents), with a discontinuous building regime, with various functions related to productive activities: storage, specialized services for production, distribution and marketing plus various services for staff and customers.

In the Local Urban Planning Regulation related to the General Urban Plan of Giurgiu Municipality and in the Urban Planning Certificate no. 123/07.03.2023 issued by Giurgiu Municipality (attached), the

permitted uses, the permitted uses with conditions and the prohibited uses in sub-area I1 are mentioned as follows:

Permitted uses:

- productive and service activities in large and medium-sized industrial constructions
- storage and distribution of goods and materials
- industrial research requiring large areas of land
- services for industrial area, transport, commercial storage, commercial services related to transport and storage
- ground and multi-storey car parks;
- maintenance and repair stations for cars and machinery:
- refuelling stations:
- trade, catering and personal services:
- service accommodation for staff providing permanent or security services, storage facilities for reusable materials: pre-collection platforms for urban waste.

Permitted uses with conditions

- current activities will continue to be allowed provided that the emissions are brought down to environmental standards within 5 years;
- expansion or conversion of current activities will be allowed provided it does not worsen the pollution situation;
- geotechnical and seismic zoning conditions shall be taken into account for any use.

Prohibited uses:

- polluting or technologically risky productive activities - the project under consideration does not fall into this category
- the location of educational establishments, public or general interest services and sports facilities within limits where pollution exceeds permitted levels in areas with protected functions
- the location of dwellings other than service dwellings
- earthworks likely to affect the landscaping of public spaces and buildings on adjacent plots.
- any earthworks that may cause run-off onto neighboring plots or prevent storm water drainage and collection.

The land proposed for the implementation of the project is located in the north-central part of the former industrial platform (Figure 3), sub-area I1 - Production, storage area. The sub-areas adjoining sub-area I1 are:

- North - Sub-area I3: Storage sub-area, services for industry compatible with protected functions (ZIROM SA), at cca. 50 m;
- East - Sub-area I3: Storage sub-area, services for industry compatible with protected functions, approx. 240 and Sub-area LM_2: Sub-area of individual and small collective dwellings in built-up areas, at cca. 430 m;
- South - Sub-area V4: Green spaces to protect infrastructure, cca. 530 m;
- West - Sub-area G6: CET and thermal points.

Figure 3 - Location of land in Sub-area I1 and neighboring sub-areas

Figure 4 - View from the ground to the North - Sub-area I3 (ZIROM SA)

2.2. THE PHYSICAL CHARACTERISTICS OF THE WHOLE PROJECT

The implementation of the project involves the construction of lightweight, metal frame constructions, namely:

- metal posts for support
- metal trusses for roof construction
- metal frameworks
- side walls made of fireproof sandwich panels

Light construction will be placed on foundations to be built on site. The fixing of the pillars to the foundations will be achieved by connections with metal anchors that will be fixed, with anchor bolts, into the concrete.

The location of the incinerator and the technological annexes involves:

- making connections for fixing them to the concrete platform
- the achievement of technological lines for the fuel supply of burners
- the construction of electrical lines and connections
- location of the construction elements of incinerator

The activity to be carried out with the equipment to be installed is the incineration of non-hazardous animal and medical waste.

To determine the incineration capacity an analysis based on:

A. incineration capacity for non-hazardous animal waste
B. incineration capacity for medical waste

For both types of waste the combustion capacity is 300 kg/h, respectively 7.2 t/day in continuous operation.

Incineration capacity of this type of incinerator, for the same volume of primary combustion chamberis given by:

- burner capacity
- waste supply rate
- rotational speed of the primary combustion chamber

Taking into account the technical characteristics of the incinerator analyzed in this paper (according to the specifications in the technical book) its incineration capacity is 300 kg/h, i.e. 7.2 t/day.

The annual incineration capacity is calculated according to the hourly capacity, the daily capacity and the number of operating days/year:

0.3 t/h x 24 h = 7.2 t/day

7.2 t/day x 320 days/year = 2304 t/year

This represents the total maximum incineration capacity for all types of waste.

The division of this capacity by type of waste will depend on the availability of waste categories for incineration (hazardous or non-hazardous medical waste, non-hazardous or non-hazardous animal waste) and on the incineration programme to be carried out (strictly during the incinerator's operational phase, after obtaining the environmental permit and other permits required by the legal provisions in force).

Metal hall

It is intended to locate a hall with the following characteristics:

- foundation made of reinforced concrete blocks
- resistance structure - metal beams
- sandwich panel walls
- sizes:
  - L = 24.68 m
  - l = 12.84 m
  - H eaves = 5 m
  - H cornice = 7.5 m
- 2-shell roof made of sandwich panels
- floor - concrete platform

Waste incinerator type IE 1000R-300

Constructive characteristics:

a) waste access room;
b) rotary, primary combustion chamber;
c) ash disposal room;
d) fixed, secondary combustion afterburner chamber;
e) supplementary air distribution system;
f) fuel distribution installation;
g) automation installation;
h) continuous and automatic waste supply system;
i) automatic ash evacuation system.

No demolition works are required to complete the project.

Site organization - Construction phase

The construction site will be placed on the existing concrete platform located in the premises of SC Friendly Waste Romania SRL, on an area of approx. 100,0 sqm representing a temporarily occupied land area.

The site organization will perform the following functions during the works:

- machinery stationary;
- storage area for equipment and materials until they are put into operation;
- temporary waste storage area during the construction phase.

Once the construction work and equipment installation is completed, the area of land occupied by the site organisation will be cleared.

The site organisation will be located in the NE area of the industrial platform, within the perimeter of the studied site.

Description of the environmental impact of the site organization work

The impact on the environmental factor air - will be insignificant negative, discontinuous, short-lived and reversible. It will be generated by the operation of the heat engines of the vehicles and machinery serving the site and their movement on the internal roads of the site organisation.

The impact on the soil environmental factor - will be insignificantly negative, discontinuous, short-lived and reversible. It will be generated by the movement of vehicles and machinery servicing the construction site as well as the handling of parts of the future construction.

The types of impacts that will manifest themselves on environmental factors are:

Short-term impact on environmental factors - will be caused by emissions of dust, chemical noxious emissions from fuel combustion, noise, vibrations, improperly managed waste, and accidental pollution with petroleum products during working hours at the construction site;

Long-term impact - will manifest itself on the soil and subsoil through excavation action during the construction period;

Insignificant residual impact - will manifest itself on the soil and subsoil through the existence of above and below ground constructions

Sources of pollutants and facilities for the containment, discharge and dispersion of pollutants into the environment during site organisation

For the air environmental factor - heat engines in the vehicles and machinery serving the site activity and their movement on the internal roads of the site organisation as well as on the external roads.

For soil and water environmental factors

- sanitary facilities generating domestic waste water;
- service staff generating household waste;
- vehicles and machinery that may have accidental loss of fuel and/or lubricants.

In order to avoid negative effects on environmental factors soil and water in case of accidental loss of fuels and/or lubricants by machinery and vehicles servicing the construction activity, a stock of biodegradable absorbent materials will be provided on site.

There is no question of facilities for the containment, discharge and dispersion of pollutants into the environment during the operation of the site organisation outside the location of waste collection containers and site sanitary units.

Site management is provided by specialist staff in accordance with the legal regulations in force.
To control emissions of pollutants into the environment will be used:

- regular overhauls and technical checks (including emission levels) of the engines of the machinery and vehicles serving the activity;
- the staff operating the machinery/means of transport make sure that the machinery operates correctly and that any faults are rectified quickly;
- avoid empty packaging of heat engines in vehicles and machinery used on the site;
- avoid the idling of heat engines in vehicles and machinery used on the site.

Site restoration works on completion of the investment, in the event of accidents and/or when work ceases

The ecological reconstruction work on completion of the investment concerns the removal of the waste specific to this activity from the land where the light construction and incinerator were located. On the surface of these lands, restoration works will be carried out in order to bring the land back to its original condition or to the one foreseen in the execution project.

Specific work in the event of accidents or at cessation of work is detailed in the following sub-chapters.

As regards the type of actions related to the response to accidental pollution, these will be briefly described below:

A. for the soil environmental factor
   - isolate the source of pollution immediately (in case of accidental loss of fuel and/or lubricants)
   - apply biodegradable absorbent material to the polluted area
   - after absorbing the petroleum product, collect the used absorbent and store it in waterproof bags
   - clean the affected soil and store it in waterproof bags
   - these quantities are delivered to authorized firms

B. for the water environmental factor - not applicable

C. for the air environmental factor
   - identify the source of the pollution (this may be emissions from a mobile source or from the movement on the road of machinery and vehicles servicing the construction activity) and analyze the cause
   - the machinery or vehicle is to be withdrawn until the causes of the emissions into the air which are likely to pollute it have been remedied
   - where pollution is caused by dust emissions from the activity or movement of machinery and/or vehicles, measures such as:

– wetting of roads or work area
– running at low speed

The estimated lifetime of an incinerator is approx. 20 years. After this period, if the decision is taken to decommission the incinerator, a number of activities will be carried out as follows:

1. de-energising the electricity supply network
2. dismantling electrical separators
3. dismantling of light constructions
4. decommissioning of the landfill for temporary storage of waste

5. dismantling of interior installations
6. dismantling/demolition of buildings
7. transport all the resulting materials to a base where they will be sorted and a decision will be taken on their further use

Restoration works will be carried out to bring the land back to its original state, concrete platform or another state depending on the decision of the environmental authorities at the time.

PROJECT SIZE

The surface area of the land related to the works is 3050,00 sqm, with the category of use of courtyard construction, in the production area, C.U.T. = 2.4 sqm ADC/sqm land and P.O.T. = 60%.

The construction site will be placed on the existing concrete platform located in the premises of SC Friendly Waste Romania SRL, on an area of approx. 100,0 sqm representing a temporarily occupied land area.

The site organization will perform the following functions during the works:

- machinery stationary;
- storage area for equipment and materials until they are put into operation;
- temporary waste storage area during the construction phase.

Once the construction work and equipment installation is completed, the area of land occupied by the site organisation will be cleared.

2.3. THE MAIN FEATURES OF THE PROJECT OPERATIONAL PHASE

The project owner proposes to build a metal structure hall and to purchase and install a rotary incinerator for the incineration of non-hazardous, medical (hazardous and non-hazardous) and animal waste.

Technical characteristics

- incineration capacity - 300 kg/h respectively 7200 kg/day in continuous operation
- fuel - LPG
- fuel consumption - 24.6 ÷ 122.5 l/h
- primary combustion chamber with the characteristics
  - primary combustion chamber volume = 10.5 m3
  - primary combustion chamber temperature - 850°C
  - 1 burner type P 61 on LPG
- secondary combustion chamber with features:
  - primary combustion chamber volume = 9.7 m3
  - primary combustion chamber temperature - 1100°C
  - 1 burner type P 61 on LPG
  - gas retention time in the secondary combustion chamber - 2 seconds
- volume of ash resulting - 3%
- measured emission parameters

Table 2 - Incinerator emission parameters

Parameter	Emission limits 30 minutes	Measured values of incinerator type IE-1000R-300
Solid particles	30 mg/m³	1.2 mg/m³

Sulfur dioxide	200 mg/m³	2.4 mg/m³
Nitrogen Dioxide*	400 mg/m³	60 mg/m³
Carbon monoxide	100 mg/m³	78.3 mg/m³

IE 1000R-300 incinerators are equipped with state-of-the-art technology, both in terms of plant efficiency and environmental protection features.

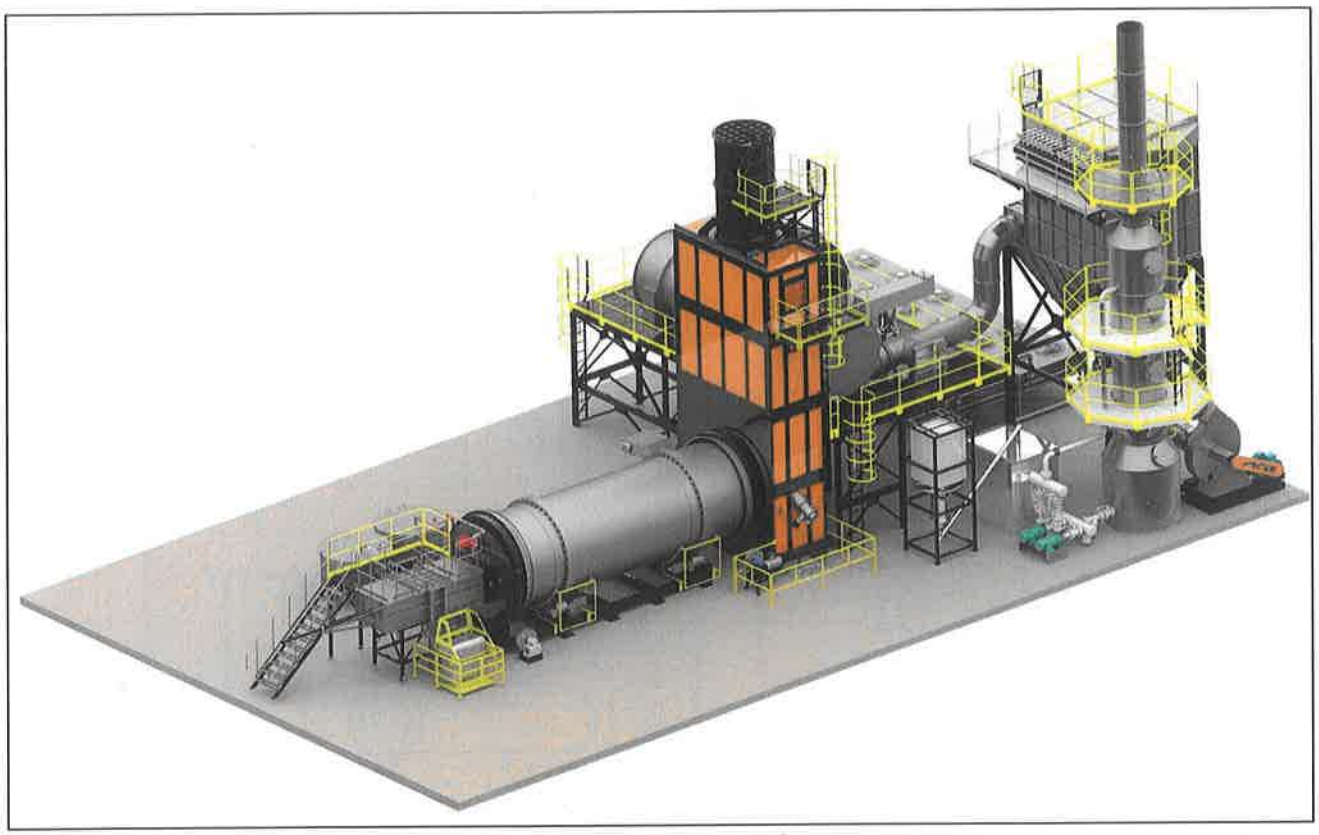


Figure 5 - Incinerator overview

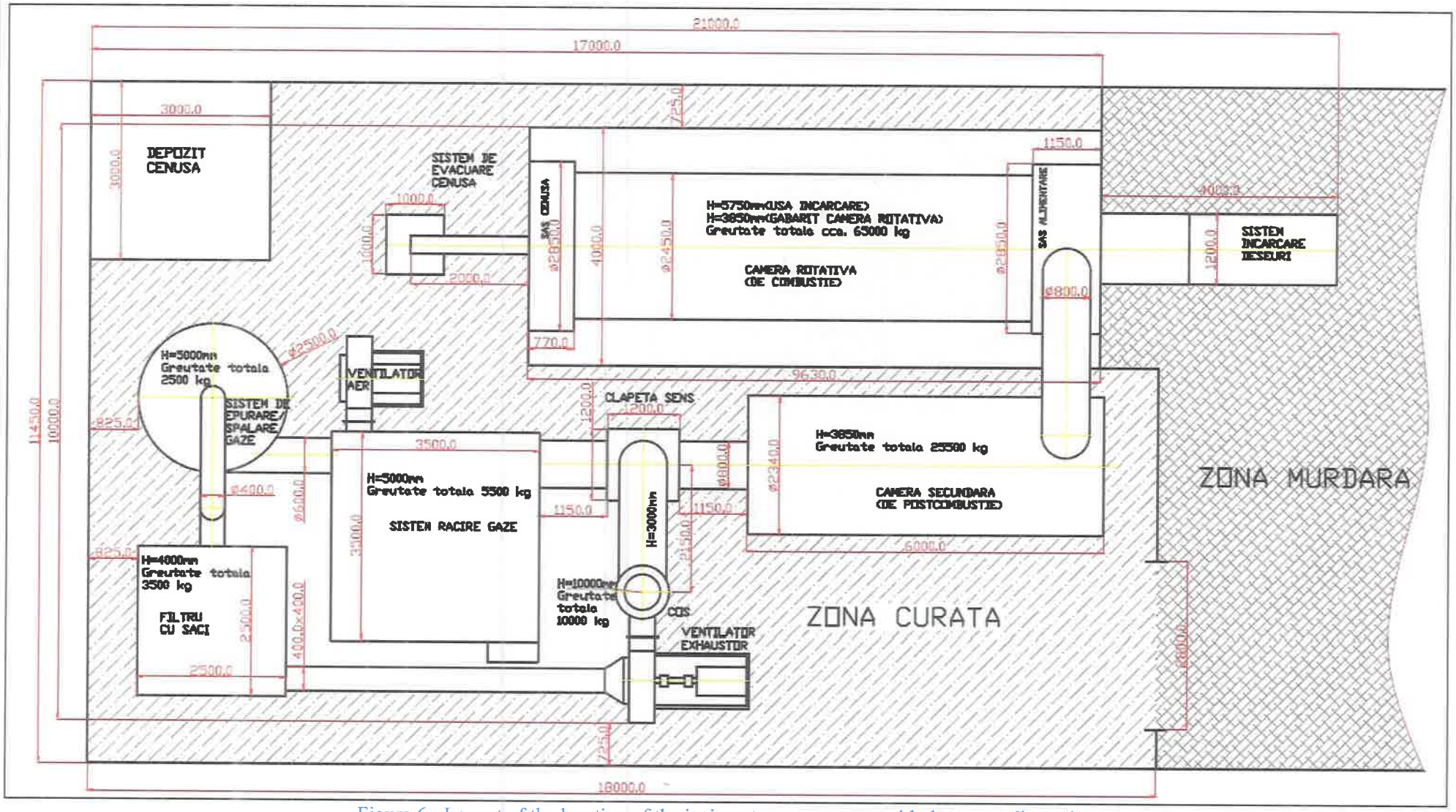


Figure 6 - Layout of the location of the incinerator components with the gauge dimensions

The IE 1000R-300 model is modern and innovative in terms of waste incineration efficiency. This is an incinerator model with a controlled air supply system designed to ensure the best conditions for incinerating a very wide range of wastes, both hazardous and non-hazardous.

Presentation of the construction elements of the incinerator type IE 1000R-300

According to the technical regulations, the IE 1000R-300 type environmental incinerator with two combustion chambers is equipped with two independent burners, so that the gases and suspended materials resulting from the primary combustion in the rotating combustion chamber pass into the fixed afterburner chamber, where any gases and suspended particles are retained and destroyed. The burners that equip the rotary green incinerator run on LPG and are each controlled by an electronic controller. This ensures a flue gas residence time (min. 2 s, according to the legislation in force) in the fixed afterburner chamber, resulting in a proper/complete combustion, which ensures that the emission values are within the limits set by the legislation in force.

The resistance frame of the incinerator is made of carbon steel pipe by cutting, mechanical machining and electric welding. The configuration of the metal structure ensures:

- mechanical strength of the assembly during the execution and operation of the installation;
- access for waste loading and ash disposal;
- supporting the incinerator components.

The metal construction has provided locations for access to the burners, viewing windows and the electrical installation of the drive and automation. It is protected by painting with primer and enamel suitable for this category of machine.

Rotary, primary combustion chamber;

The rotating primary combustion chamber has a volume of 10.5 m³ and is equipped with an injector to introduce additional air, thus ensuring complete and homogeneous combustion up to a temperature of 850°C. The burner in this chamber, type P 61, on LPG fuel with a consumption of (24.6 ... 122.5) l/h, is controlled by an electronic microprocessor controller and is easy to use.

The combustion chamber (primary combustion) masonry is made of refractory brick or insulating concrete, outwards and at the ends of the rotary chamber.

Fixed, secondary combustion afterburner chamber;

The fixed post-combustion secondary combustion chamber has a volume of 9.7 m³, in which the complete combustion of volatile organic compounds takes place at a temperature of 1100°C, ensuring a residence time of min. 2 seconds. The burner in this room, type P 61, on LPG fuel with a consumption of (24,6 ... 122.5) l/h, is controlled by an electronic microprocessor controller and is easy to use.

The temperature in this room is programmable and monitored with a thermocouple. The measured temperature in the fixed afterburner chamber and the programmed temperature will be read on a digital display.

In the incineration process the gases from the primary combustion chamber will be sucked into the scrubbing area, which before being discharged, will be scrubbed and cleaned so as not to cause negative effects on the environment.

The afterburner (secondary combustion) chamber is made of brick and refractory concrete, similar to the rotary chamber.

The afterburner chamber is equipped with an emergency chimney, which in the event of a fault, allows the flue gases to be removed until the incineration of the current char has been completed.

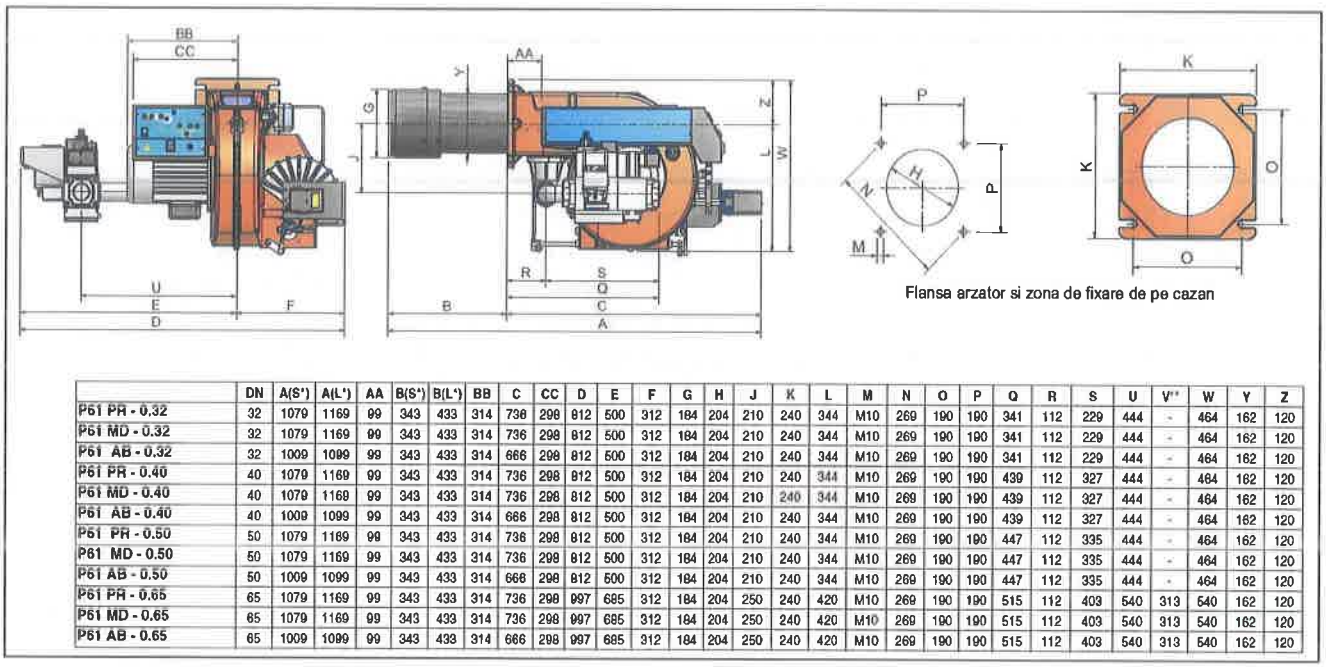
Each combustion chamber is equipped with a burner, which starts automatically when the flue gas temperature drops below 850°C sau 1100°C, after the last combustion air intake. These burners are also

used in the start-up and shut-down phases, in order to ensure the combustion temperatures in these phases and also during the period when unburned waste is in the combustion chamber. Burners may not be fueled with fuels that are likely to cause higher emissions than those resulting from the combustion of petrol in accordance with Article 50(2). 3 of Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions (integrated pollution prevention and control) of 24 November 2010.

The technical characteristics of the burners used in the 2 combustion chambers are shown below:

Table 3 - Technical characteristics of the burners

Tip ARZATOR		P61 M-...0.xx	P65 M-...0.xx
Putere	min. - max. kW	160 - 800	270 - 970
Combustibil		Gaz Metan	Gaz Metan
Categorie		(vezi urmatorul paragraf)	(vezi urmatorul paragraf)
Debit de gaz	min.- max. (Nm^3/h)	17 - 84.7	28.6 - 103
Presiune gaz	min.-max. mbar	(vezi Nota 2)	(vezi Nota 2)
Tensiune de alimentare		230V 3~ / 400V 3N ~ 50Hz	230V 3~ / 400V 3N ~ 50Hz
Total putere consumata	kW	1.6	2
Putere motor ventilator	kW	1.1	1.5
Grad de protectie		IP 40	IP 40
Greutate aprox.	kg	55 - 70	60 - 80
Mod de operare		Doua trepte - Progresive - - Complet modulante	Doua trepte - Progresive - - Complet modulante
Tip rampa - Racord de gaz - 32		$1"_{1/4}$ / $Rp1_{1/}$	$1"_{1/4}$ / $Rp1_{1/}$
Tip rampa - Racord de gaz - 40		$1"_{1/2}$ / $Rp1_{1/2}$	$1"_{1/2}$ / $Rp1_{1/2}$
Tip rampa - Racord de gaz - 50		2" / Rp2	2" / Rp2
Tip rampa - Racord de gaz - 65		$2"_{1/2}$ / DN65	$2"_{1/2}$ / DN65
Temperatura de lucru	°C	-10 ÷ +50	-10 ÷ +50
Temperatura stocare	°C	-20 ÷ +60	-20 ÷ +60
Durata de exploatare *		Intermitent	Intermitent



Flansa arzator si zona de fixare de pe cazan

	DN	A(S*)	A(L*)	AA	B(S*)	B(L*)	BB	C	CC	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	U	V**	W	Y	Z
P61 PR - 0.32	32	1079	1169	99	343	433	314	736	298	812	500	312	184	204	210	240	344	M10	269	190	190	341	112	229	444	-	464	162	120
P61 MD - 0.32	32	1079	1169	99	343	433	314	736	298	812	500	312	184	204	210	240	344	M10	269	190	190	341	112	229	444	-	464	162	120
P61 AB - 0.32	32	1009	1099	99	343	433	314	666	298	812	500	312	184	204	210	240	344	M10	269	190	190	341	112	229	444	-	464	162	120
P61 PR - 0.40	40	1079	1169	99	343	433	314	736	298	812	500	312	184	204	210	240	344	M10	269	190	190	439	112	327	444	-	464	162	120
P61 MD - 0.40	40	1079	1169	99	343	433	314	736	298	812	500	312	184	204	210	240	344	M10	269	190	190	439	112	327	444	-	464	162	120
P61 AB - 0.40	40	1009	1099	99	343	433	314	666	298	812	500	312	184	204	210	240	344	M10	269	190	190	439	112	327	444	-	464	162	120
P61 PR - 0.50	50	1079	1169	99	343	433	314	736	298	812	500	312	184	204	210	240	344	M10	269	190	190	447	112	335	444	-	464	162	120
P61 MD - 0.50	50	1079	1169	99	343	433	314	736	298	812	500	312	184	204	210	240	344	M10	269	190	190	447	112	335	444	-	464	162	120
P61 AB - 0.50	50	1009	1099	99	343	433	314	666	298	812	500	312	184	204	210	240	344	M10	269	190	190	447	112	335	444	-	464	162	120
P61 PR - 0.65	65	1079	1169	99	343	433	314	736	298	997	685	312	184	204	250	240	420	M10	269	190	190	515	112	403	540	313	540	162	120
P61 MD - 0.65	65	1079	1169	99	343	433	314	736	298	997	685	312	184	204	250	240	420	M10	269	190	190	515	112	403	540	313	540	162	120
P61 AB - 0.65	65	1009	1099	99	343	433	314	666	298	997	685	312	184	204	250	240	420	M10	269	190	190	515	112	403	540	313	540	162	120

Figure 7 - Features of the P 61 burner gauge

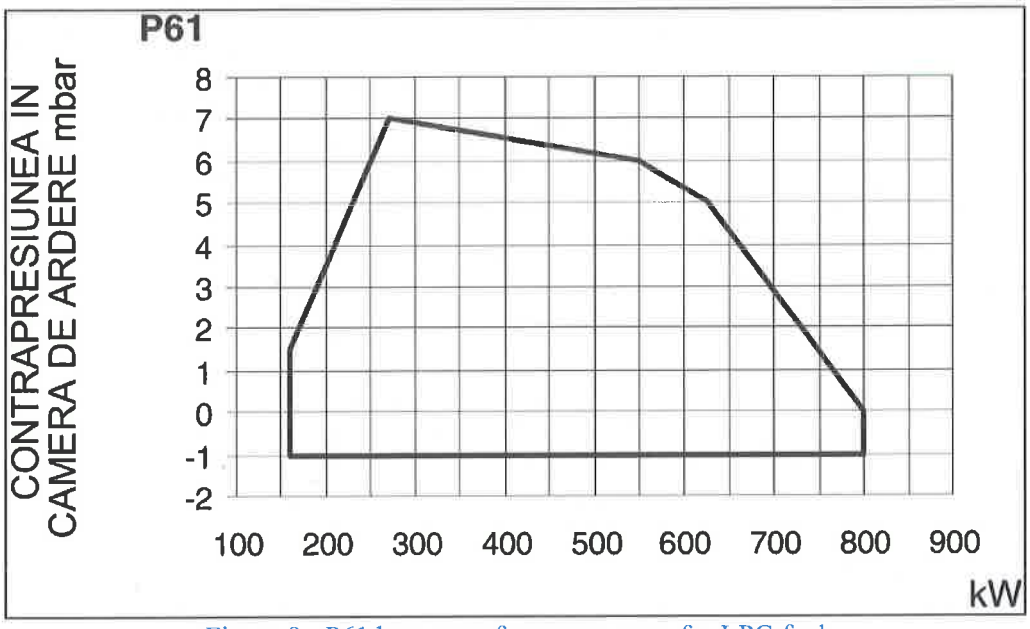


Figure 8 - P61 burner performance curve for LPG fuel

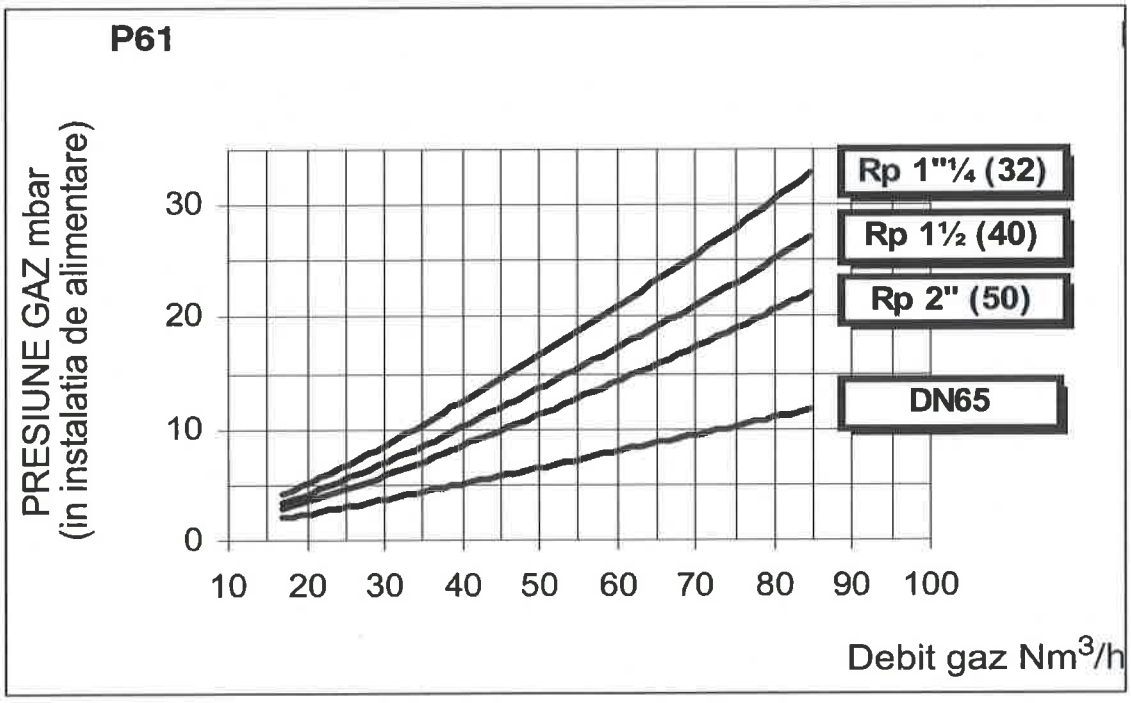


Figure 9 - Installation gas pressure/gas flow curves

The burner operating parameters are continuously monitored by sensors that transmit signals to the process computer software. If any abnormalities occur in the operation of the burners, they are immediately signaled visually and acoustically so that timely action can be taken.

Supplementary air distribution system

The extra air is necessary for correct and complete combustion. The supplementary air distribution system consists of a general fan for supplementary combustion air, with the characteristics p = 530 mm H_2O; P = 11 KW, flow rate = 5,000 Nm^3/h, and with elements for automatic regulation of the air flow sections from the air conduction paths to the access points in the two combustion chambers and to the chimney connection (to ensure gas ejection and dilution in case of damage).

Fuel distribution installation

The fuel distribution system supplies the two burners (the rotating combustion chamber and the fixed afterburner chamber) from the distribution network via a tap connection.

Automation installation

The automation system ensures temperature regulation to the prescribed values in the two chambers, ensures correct combustion regulation and protection of the entire installation by means of safety elements and blocking the operation of the equipment in the event of failure to comply with certain operating conditions of the burners or exceeding the prescribed temperatures.

The automation system independently monitors (records and prints) the following parameters:

1. oxygen (O_2): (0 ... 21)%;
2. temperature: (0 ... 1370)°C, both in the combustion chamber and in the afterburner chamber.

The automatic adjustment of the incinerator operation is as follows:

1. the temperatures in each combustion chamber are continuously monitored:
   a. if the temperature reaches the maximum value in the soft setting, the supply of LPG to the burners in the room in question is reduced or completely stopped
   b. if the temperature reaches the maximum value in the soft setting, the supply of LPG to the burners in the room in question is reduced or completely stopped
2. the oxygen concentration is monitored and if its value falls below the minimum value in the software, the fan speed is automatically switched on or increased to provide additional air supply to the combustion chambers or the air inlet to the burners

The incinerator automation plant also contains its own memory recording system, which can be downloaded to a computer at a later date, as well as the option of card extraction and portability. It offers the possibility of printing instantaneous values at a time without downloading all the data and ensures that data can be transmitted directly if the system is connected to a computer at the time of incineration.

Continuous and automatic waste supply system

Incineration waste is expected to be collected and brought to the incineration plant in bins. They are placed in the loading hopper, from where they are taken by a hydraulic loading system into the feed lock, where a hydraulic piston transfers them to the primary chamber of the incinerator and thus ensures the feed rate of the incinerator of 300 kg/h. Waste is fed in continuously, provided that occupational health and safety rules are strictly observed.

Automatic ash removal system

Since the ecological incinerator has a primary, rotating combustion chamber, the ash is continuously drained into a box and then automatically discharged through a rotating chute into another box where it is loaded into bags. The ash is inert, non-putrescible, sterile and will be analyzed for carbon and heavy metal content by specialized laboratories.

Dry flue gas cleaning/scrubbing system

This system consists of:

a) - flue gas cooling system;

b) - dry absorbing system for flue gas cleaning;
c) – dry particle filtration system;
d) – exhaust fan for exhausting combustion gases;
e) - flue gas chimney and chimney connection.

The flue gas is introduced in a controlled and directed way into the flue gas cleaning system, of the "dry absorbing system" type, in a reactor, specially dimensioned for this purpose, where the Solvay-Bicar mixture (NaHCO3 mixed with activated carbon) is injected through a nozzle. When it meets the flue gas with the sorbent in the powder phase in suspension and combines as the chemical reaction of pollutant absorption takes place, resulting in a powder which is then collected in the lower part of the reactor without the need for additional drying of the depollutant. The installation of such a system for the elimination of pollutants from flue gases by means of a "dry absorbing system" is designed and dimensioned to limit the discharge of pollutants and dust particles into the atmosphere, in such a way as to comply with the emissions into the atmosphere according to the legislation in force (GD 128/2002, supplemented and updated by GD 268/2005).

In the event of abnormal operation of the gas flushing system which may lead to malfunctions, the electronic monitoring system will signal a potential malfunction in good time and the necessary corrective measures will be taken.

Following the flue gas cleaning system, the dry filter system and then the exhaust will be installed. The dry particle filtering system is equipped with a bag filter.

Technical features are:

- filtered flow 5000 m^3/h
- filtered area 360 m^2
- type of filter material filter bags made of FNS® (P84, fiber glass, PTFE)
- maximum operating temperature T max.(continuous) = 190°C
- pressure drop 50-150 mmH_2O.

The dry particle filtration system consists of a 144-bag filter, which is cleaned with counter-current air, resulting in a filtered air flow of 10000 m^3/h. This flow rate is calculated to take care of the peak loads that occur when the incineration process starts. At this point any volatile fractions in the waste being incinerated ignite almost instantaneously and generate a volume of flue gas in excess of the working flow rate of 5000 m^3/h. The duration of the phenomenon is very short, in the order of 1 to 5 minutes, after which the normal working flow returns.

The life of a filter bag is 6000 hours, after which it must be replaced.

Exhaust fan for exhausting combustion gases;

Technical characteristics for the exhaustor for flue gas exhaust are:

- centrifugal fan type T_{max} =350°C (with cooling fan) with electric motor
- suction/discharge dimensions: Ø 406 mm/355 x 250 mm.

The exhaust system for the flue gas discharge consists of a centrifugal fan with cooling fan, which has a flow rate of 10000 m^3/h. This flow has been sized to take the peak loads that occur when the incineration process is initiated (see paragraph above)

The benefits of this gas cleaning solution are:

Pollutant removal efficiency

- HCl > 98.0%
- SO2 >98.0%
- HF >98.0%
- Hg >98.0%
- Dioxin >98.0%

Low investment costs

- It does not use water thus eliminating the problems of subsequent water treatment;
- Very low collateral energy consumption;
- There is no need to reheat the gas after treatment;
- It does not require a specialized sludge treatment plant.

Stack (flue gas exhaust)

The combustion gases from the combustion chamber pass into the post-combustion chamber, which is provided at the bottom with an injector and which ensures that the temperature of the gases at the outlet is raised to 1100°C, in accordance with the applicable regulations in force concerning the ecological incineration of waste. The stationary time in the afterburner chamber and at the above mentioned temperature ensures the destruction of the organic emission components within the required limits. The flue gas outlet pipe connects the incinerator to the chimney. The stack is made of stainless steel, with thermal insulation, with a diameter Ø 500 mm and a height of 10 m, compared to the height +/- 0.00.

Cold rooms

Two cold rooms will be set up for the temporary storage of animal and medical waste. They will have the features:

- useful volume = 16 m^3
- sizes 3 x 2,6 x 2 m
- working temperatures 4 ÷6°C

LPG household

To provide the fuel needed to operate the incinerator, an LPG household will be built consisting of:

- 4 metal tanks with V = 5000 l
- 2 concrete wall cavities, explosion-proof and fireproof

Car parking

For the smooth running of the business, the company has purchased 4 Ford Transit trucks with a capacity of 3.5 tons. They will be authorized and marked as required by law.

The incineration activity does not result in products or by-products but only in waste ash. The resulting ash quantity is a maximum of 3% of the incinerated waste.

Technology flows

The only process taking place on the site under review is waste incineration. **The new equipment to be installed will be used exclusively for the incineration of non-hazardous waste, animal waste and hazardous and non-hazardous medical waste.**

The technological flows and facilities for complying with the legal requirements for their organisation will be described below for all types of waste entering the incineration process.

In a first phase the common rules for all types of waste will be followed, namely:

- prior to acceptance of the waste at the waste incineration plant the operator shall check that it is accompanied by all documents required by national and European waste legislation established by Decision 2000/532/EC
- prior to acceptance of the waste at the waste incineration plant the operator determines by weighing the mass of each type of waste and check in the accompanying documents whether it has passed

the waste code according to the classification of the European waste list established by Commission Decision 2014/955/EU

- the operator of the waste incineration plant is obliged to comply with internal procedures regarding the necessary precautionary measures for the delivery and reception of waste in order to prevent or limit, as far as possible, pollution of air, soil, surface water, groundwater and other negative effects on the environment such as odors, noise and direct risks to human health.

A) Technology flow for the incineration of non-hazardous and non-hazardous animal waste

1. Waste reception
   - on arrival of the means of transport at the site, the accompanying documents are checked as described above
   - waste is weighed
   - the input register is completed for the type of waste received
   - no sampling of waste is required
2. Unloading of waste - this is achieved with a forklift. The waste bins are taken from the means of transport and temporarily stored on the concrete platform intended for this purpose. This platform is partially covered with a lightweight awning.
3. Waste storage
   - if the non-hazardous waste does not enter the incineration stream directly, it is temporarily stored on the concrete platform specially designed for this purpose. This platform is located at the entrance to the site and has S = 35 sqm and a capacity of approx. 10 t (taking into account the storage matrix requiring access space and the relative density of waste). Temporary storage will not exceed 24 - 48 hours.
   - If the waste is of animal origin (perishable), it is temporarily stored in cold room 1 with a storage capacity of 16 m3 (approx. 10 t taking into account the storage matrix which requires access space and the relative density of the waste). Animal waste that is packaged is only partially subjected to a tertiary or secondary packaging removal process if possible. This process takes place in the technical room located on the concrete platform next to the waste reception platform. The packaging waste resulting from this process is sorted and then deposited, by category for recycling, in the area designated for selective waste collection, i.e. on the concrete platform in front of the technical room.
4. From the unloading and/or temporary storage area, the waste containers are taken by the transport equipment to the incinerator area. Here the containers are discharged into the continuous feed system of the incinerator. After unloading, the empty containers are taken to the sanitation area, i.e. the concrete platform with S = 42 sqm for both sanitation/disinfection of the means of transport and the containers used for transporting waste.

From here, the sanitized containers are moved to the area at the end of the platform where they are loaded onto the transport vehicles that will take them to the waste collection points from the generators.

At least at this stage, no means of reducing the volume of packaging resulting from the unpacking of waste arriving at the site will be used. If the need for such an operation is subsequently identified, then such equipment will be purchased and installed, with due regard to environmental procedures for both the implementation and operational phases.

The technological flows for the incineration of non-hazardous waste and animal waste are shown below (Figures 10 and 11):

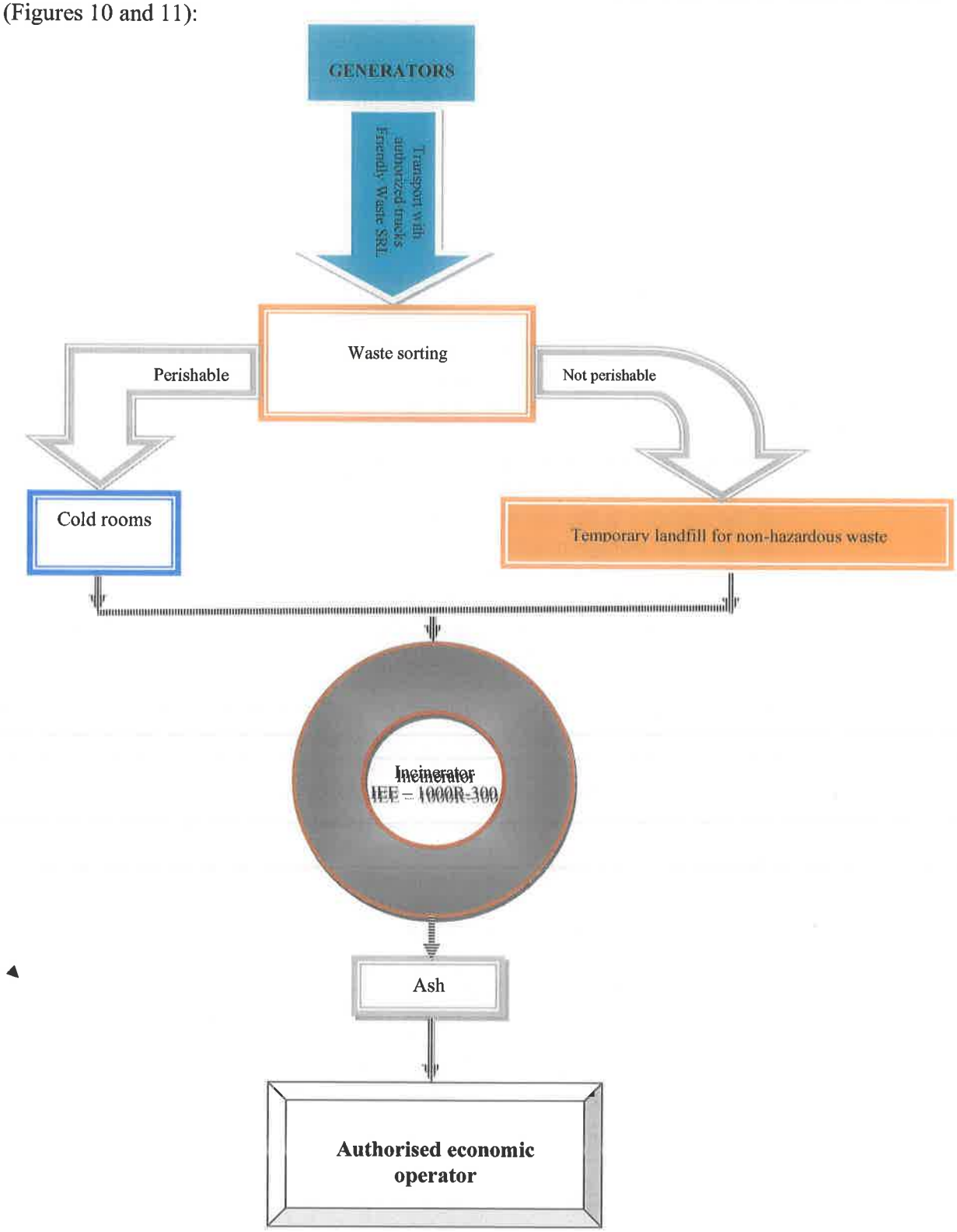


Figure 10 - Non-hazardous waste stream

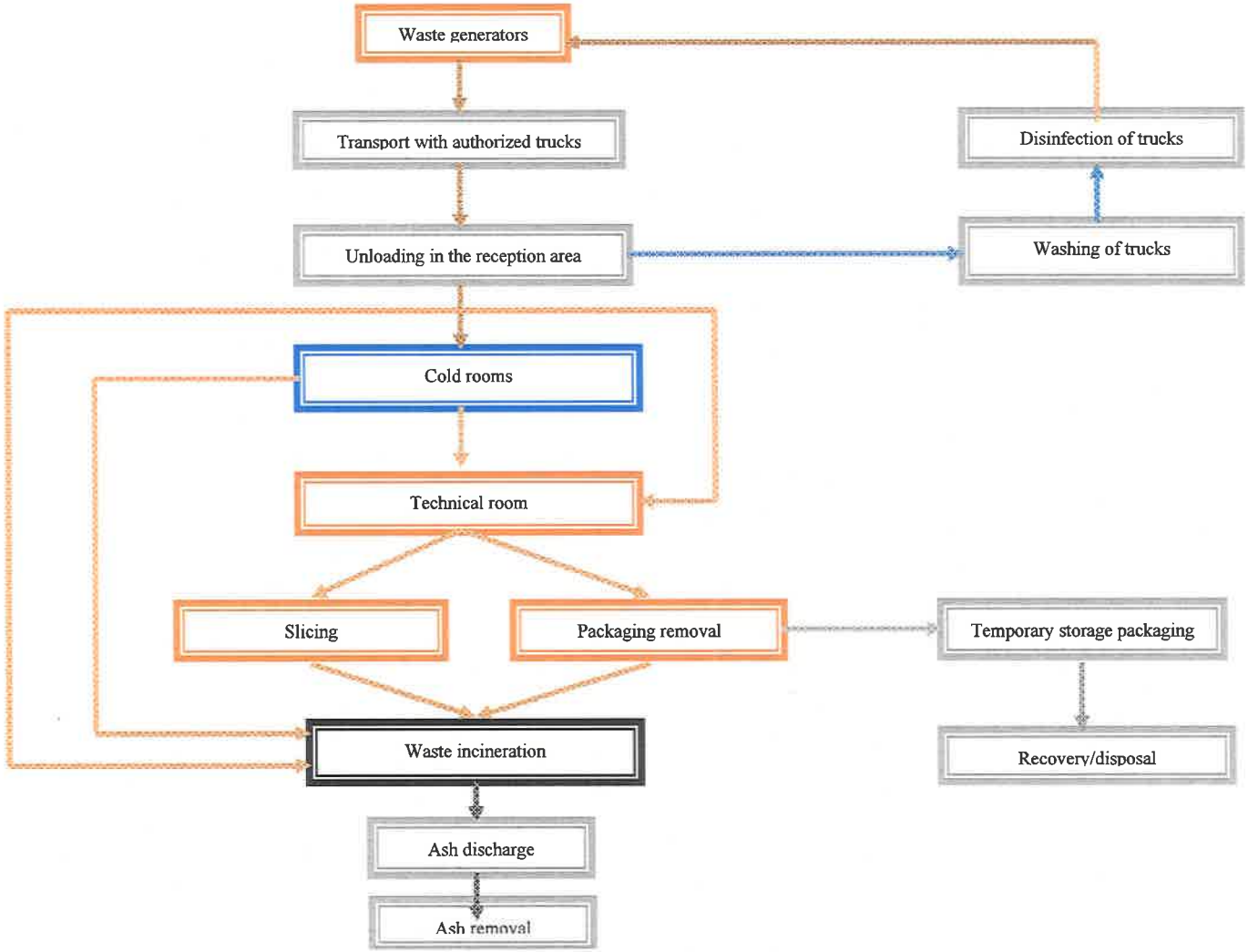


Figure 11 - Non-hazardous animal waste stream

B) Technology flow for medical waste incineration

1. Waste reception
   - on arrival of the means of transport at the site, the accompanying documents are checked
   - waste is weighed
   - the input register is completed for the type of waste received
   - sampling of medical waste is neither required nor permitted
2. Unloading the waste - this is achieved with a forklift or manually if it is not too heavy. The waste bins are taken from the means of transport and are temporarily stored on the concrete platform in the area specially designated for this purpose. This platform is partially covered with a lightweight awning.
3. Waste storage - for the situation where medical waste does not go directly into the incineration stream it is temporarily stored in cold room 2. Temporary storage is for a maximum of 24 to 48 hours until the incinerator is released.
4. From the unloading and/or temporary storage area, the waste containers are taken by the transport equipment to the incinerator area. Here the containers are discharged into the continuous feed system of the incinerator. After unloading, the empty containers are taken to the sanitation area, i.e. the concrete platform with S = 42 sqm for both sanitation/disinfection of the means of transport and the containers used for transporting waste.

From here, the sanitized containers are moved to the area at the end of the platform where they are loaded onto the transport vehicles that will take them to the waste collection points from the generators.

The following clarifications are made in relation to the packaging in which medical waste is brought:

1. for hazardous medical waste - this is brought in special bags or boxes and incinerated together with the packaging in which it is brought
2. for non-hazardous medical waste:

- if it is brought in special bags for this type of waste, it is incinerated together with the packaging in which it is brought
- if they are brought in special bags placed in the bins for these types of waste, then the bins are disinfected in the area specially set aside for this process (the same area is also used for disinfecting the means of transport) located on the concrete platform at the entrance to the site, which is equipped with all the means necessary for this purpose. Disinfection is achieved with Biclosol solution, using hot water pressure washers such as Kracher or other brands.

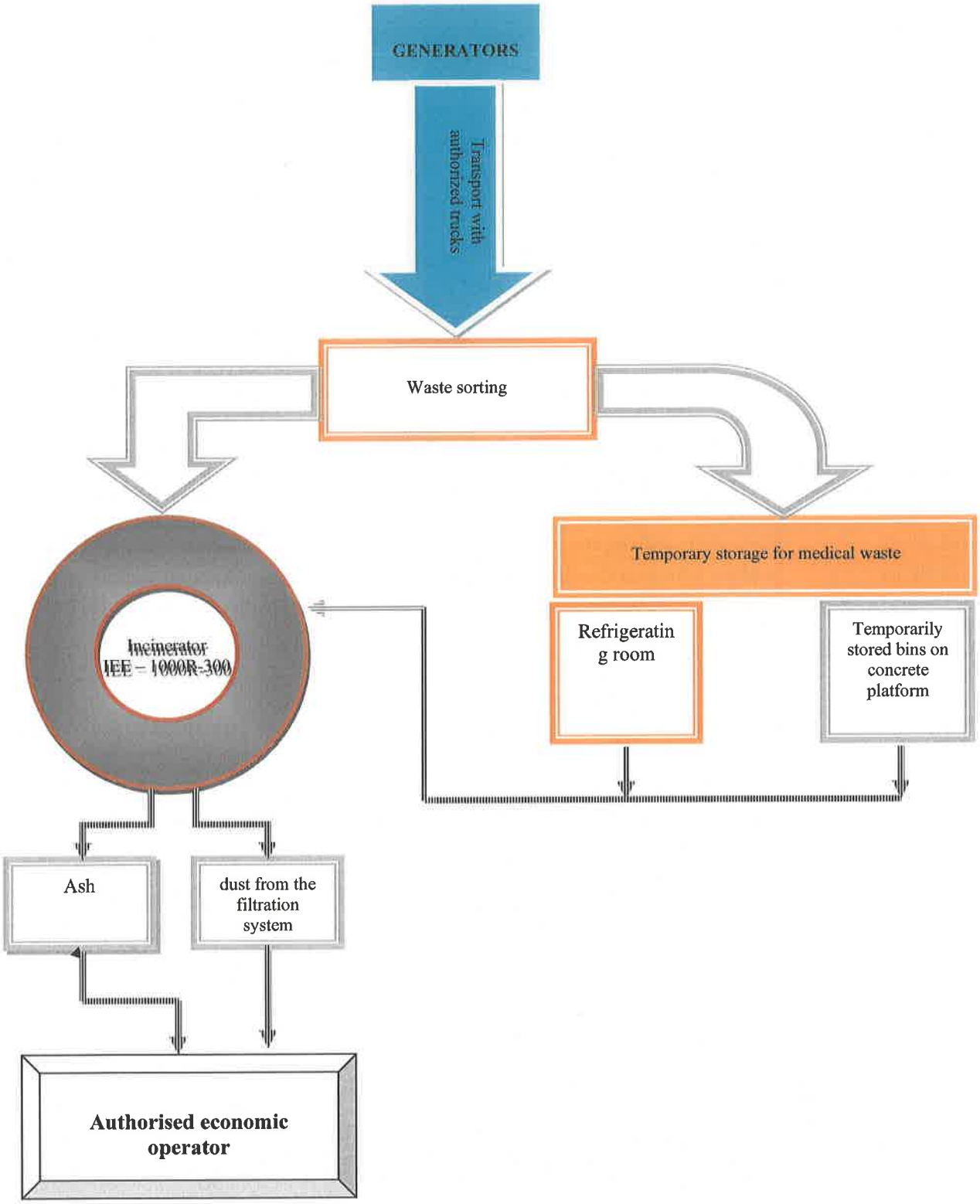


Figure 12 - Medical waste stream

The project owner - Friendly Waste Romania SRL proposes to use the incinerator to incinerate medical waste (non-hazardous and hazardous) and non-hazardous waste (including animal waste), packaged and unpackaged.

The tables below (Table 3, 4, and 5) show the types of waste to be incinerated.

The classification and coding of waste, including hazardous waste, is carried out accordingly:

a) Commission Decision 2000/532/EC of May 3, 2000 replacing Decision 94/3/EC establishing a list of waste according to Art. 1 letter (a) of the Directive 75/442/EEC of the Council, concerning waste and the Council Directive 94/904/CE establishing a list of hazardous waste according to Art. 1 para. (4) of the Council Directive 91/689/EEC on the hazardous waste, with further amendments, according to Art. 7 para. (1) of the Government Emergency Ordinance no. 92/2021 on the waste regime.

Table 4 - Types of **non-hazardous medical waste** to be incinerated in the incineration plant

18	WASTES FROM HEALTH CARE AND/OR VETERINARY ACTIVITIES AND/OR RELATED RESEARCH (excluding food preparation wastes from kitchens or restaurants not arising directly from health care activities)
18 01	wastes from prevention, diagnosis and treatment activities of health care facilities
18 01 01	sharps (except 18 01 03)
18 01 02	body parts and organs including blood bags and blood preserves (except 18 01 03)
18 01 04	wastes whose collection and disposal is not subject to special requirements in order to prevent infection (e.g. dressings, plaster casts, linen, disposable clothing, diapers)
18 01 07	chemicals other than those mentioned in 18 01 06
18 01 09	medicines other than those mentioned in 18 01 08
18 02	waste from veterinary units for research, diagnosis, treatment and prevention of disease
18 02 01	sharps (except 18 02 02)
18 02 03	wastes whose collection and disposal are not subject to special requirements in order to prevent infection
18 02 06	chemicals other than those mentioned in 18 02 05
18 02 08	medicines other than those mentioned in 18 02 07

Table 5 - Types of **hazardous medical waste** to be incinerated in the incineration plant

18	WASTES FROM HEALTH CARE AND/OR VETERINARY ACTIVITIES AND/OR RELATED RESEARCH (excluding food preparation wastes from kitchens or restaurants not arising directly from health care activities)
18 01 03*	wastes whose collection and disposal is subject to special requirements in order to prevent infection
18 01 06*	chemicals consisting of or containing hazardous substances
18 01 08*	cytotoxic and cytostatic medicines
18 02	waste from veterinary units for research, diagnosis, treatment and prevention of disease
18 02 02*	to prevent infection
18 02 05*	chemicals consisting of or containing hazardous substances
18 02 07*	cytotoxic and cytostatic medicines

Table 6 - Types of **non-hazardous waste** to be incinerated in the incineration plant

02 WASTES FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING AND FISHING, FOOD PREPARATION AND PROCESSING	
02 01	wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing
02 01 01	sludges from washing and cleaning
02 01 02	animal tissue waste
02 01 04	waste plastics (except for packaging)
02 01 06	animal faeces, urine and manure (including spoiled straw), effluent, collected separately and treated off-site
02 01 09	agrochemical waste other than those mentioned in 02 01 08
02 01 99	wastes not otherwise specified
02 02	wastes from the preparation and processing of meat, fish and other foods of animal origin
02 02 01	sludges from washing and cleaning
02 02 02	animal tissue waste
02 02 03	materials unsuitable for consumption or processing
02 02 04	sludges from treatment of own effluent
02 02 99	wastes not otherwise specified
02 03	wastes from fruit, vegetables, cereals, edible oils, cocoa powder, coffee, tea and tobacco preparation and processing; conserve production; yeast and yeast extract and molasses preparation and fermentation
02 03 01	sludges from washing, cleaning, peeling, centrifuging and separation
02 03 02	wastes from preserving agents
02 03 03	wastes from solvent extraction
02 03 04	materials unsuitable for consumption or processing
02 03 05	sludges from treatment of own effluent
02 03 99	wastes not otherwise specified
02 05	wastes from the dairy products industry

02 05 01	materials unsuitable for consumption or processing
02 05 02	sludges from treatment of own effluent
02 05 99	wastes not otherwise specified
02 06	wastes from the baking and confectionery industry
02 06 01	materials unsuitable for consumption or processing
02 06 02	wastes from preserving agents
02 06 03	sludges from treatment of own effluent
02 06 99	wastes not otherwise specified
02 07	wastes from the manufacture of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa)
02 07 01	wastes from washing, cleaning and mechanical reduction of raw materials
02 07 02	wastes from spirits distillation
02 07 03	wastes from chemical treatment
02 07 04	materials unsuitable for consumption or processing
02 07 05	sludges from treatment of effluent in the premises
02 07 99	wastes not otherwise specified
18	**WASTES FROM HEALTH CARE AND/OR VETERINARY ACTIVITIES AND/OR RELATED RESEARCH (excluding food preparation wastes from kitchens or restaurants not arising directly from health care activities)**
18 01	wastes from prevention, diagnosis and treatment activities of health care facilities
18 01 01	sharp objects (except 18 01 03)
18 01 02	body parts and organs including blood bags and preserved blood (except 18 01 03)
18 01 04	wastes whose collection and disposal is not subject to special requirements in order to prevent infection (e.g. dressings, plaster casts, linen, disposable clothing, diapers)
18 01 07	chemicals other than those mentioned in 18 01 06
18 01 09	chemicals other than those mentioned in 18 01 08
18 02	waste from veterinary units for research, diagnosis, treatment and prevention of disease
18 02 01	sharp objects (except 18 02 02)
18 02 03	wastes whose collection and disposal are not subject to special requirements in order to prevent infection
18 02 06	chemicals other than those mentioned in 18 02 05
18 02 08	chemicals other than those mentioned in 18 02 07

Non-hazardous and medical waste will be collected from various generators throughout the country on the basis of contracts to be concluded by the project holder - Friendly Waste Romania S.R.L. upon commissioning of the facility after obtaining the environmental permit.

Waste transport

The transport of waste will be carried out in compliance with the provisions of Government Decision no. 1076/2008 on the transport of hazardous and non-hazardous waste in Romania.

Non-hazardous animal waste (animal by-products and derived products not intended for human consumption of categories 1, 2 and 3 categorized under *Regulation (EC) No. 1069/2009 of the EUROPEAN PARLIAMENT AND OF THE COUNCIL of October 21st, 2009 laying down health rules concerning animal by-products and derived products not intended for human consumption and*

repealing (EC) Regulation no. 1774/2002), will be collected from the generators and owners, in special bins, in accordance with the provisions of *Order of ANSVSA president no. 16/2010 for the approval of Sanitary veterinary norm on the sanitary-veterinary registration/authorization procedure of the collection units/centers of origin and means of transport in the animals health and wellfare, with further amendments and completions* (240 – 1100 l bins) and carried with the trucks of the equipment.

The transport of hazardous waste to be incinerated will be carried out with the trucks provided, after authorization by the ADR, or with authorized trucks of third parties (companies authorized for the collection of waste of the category to be incinerated on the analyzed site).

Calorific value and hazardous waste content

The available data for some groups of hazardous waste to be incinerated in the analyzed plant are presented below:

Table 7: Characteristics of the types of hazardous waste to be incinerated in the analyzed incinerator

Waste code	Name according to Decision 2014/955/EU	Estimated maximum quantity[1] to be treated (t/year)	Minimum mass flow[2] (kg/h)	Maximum mass flow[3] (kg/h)	Minimum calorific value Mj/kg s.u. Kcal/l Kcal/kg s.u.	Maximum calorific power Mj/kg s.u. Kcal/l Kcal/kg s.u.	Maximum content of						
							polychlorinated biphenyls mg/kg s.u.	pentachloride-phenol mg/kg s.u.	chlorine chlorides mg/kg s.u.	fluorine fluorides mg/kg s.u.	Sulphur (sulphates) mg/kg s.u.	heavy metals mg/kg s.u.	
18 01 03*	wastes whose collection and disposal is subject to special requirements in order to prevent infection	1200	100	300	13.64 Mj/kg s.u.	26.82 Mj/kg s.u.	-	-	% s.u. = 1.95 2840	1.2	- 4831	Arsenic Barium Cadmium Total Chromium Copper Mercury Molybdenum Nickel Lead Stibium Selenium Zinc	<0.01 0.99 <0.05 0.89 0.70 0.15 1.21 0.09 0.43 0.15 0.15 21.34
18 01 06*	chemicals consisting of or containing hazardous substances	10	100	300	13.408 Mj/kg s.u.	42 Mj/kg s.u.	-	-	% s.u. = 1.95 2840	1.2	- 4831	Arsenic Barium Cadmium Total Chromium Copper Mercury Molybdenum Nickel Lead	<0.01 0.99 <0.05 0.89 0.70 0.15 1.21 0.09 0.43 0.15

[1] **the quantities are indicative** because they depend directly on the quantities in the commercial contracts that the holder will conclude with the generators of these categories of waste once the incinerator is commissioned
[2] data provided in the technical book of the incinerator
[3] Idem footer 2

												Stibium Selenium Zinc	0.15 21.34
18 01 08*	cytotoxic and cytostatic medicines	1	100	300	4	24	-	-	-	-	-	-	-
18 01 10*	amalgam waste from dental care	0.2	100	300	-	-	-	-	-	-	-	Mercury Silver Tin Copper Zinc	50% 35% 10% 4% 1%
18 02 02*	wastes whose collection and disposal is subject to special requirements in order to prevent infection	5	100	300	13.408 Mj/kg s.u.	42 Mj/kg s.u.	-	-	-	-	--	Arsenic Barium Cadmium Total Chromium Copper Mercury Molybdenum Nickel Lead Stibium Selenium Zinc	<0.01 0.99 <0.05 0.89 0.70 0.15 1.21 0.09 0.43 0.15 0.15 21.34
18 02 05*	chemicals consisting of or containing hazardous substances	5	100	300	13.408 Mj/kg s.u.	42 Mj/kg s.u.	-	-	79	1.2	1.7	Arsenic Barium Cadmium Total Chromium Copper Mercury Molybdenum Nickel Lead Stibium Selenium Zinc	<0.01 0.99 <0.05 0.89 0.70 0.15 1.21 0.09 0.43 0.15 0.15 21.34

18 02 07*	cytotoxic and cytostatic medicines	2	100	300	-	-	-	-	-	-	-	-	-

Electricity - the incinerator will be supplied with electricity from the existing grid on the site, which in turn is connected to the local electricity grid.

The maximum daily electricity consumption of the incinerator is given by the formula:

- installed electrical power x no. of operating hours/day = 98 kW x 10 = 980 kW/day

For related activities (lighting, incinerator power supply drive, etc.) consumption is estimated at approx. 2 kW/day.

Summing up all potential electricity consumptions, we arrive at a maximum consumption of 982 kW/day, i.e. an estimated annual consumption given by the formula:

- no. of operating days/year x daily consumption = 320 days x 982 kW/day = 314240 kW/year = 314,24 MWh/year

Fuels used

The fuels to be used are diesel and LPG and the activities where they will be used are as follows:

- LPG in the incineration of non-hazardous and medical waste;
- diesel, for transporting waste from generators to the incinerator and for handling waste with the forklift truck and for operating the generator set in case of a power failure.

The maximum quantities of fuel that can be used are:

1. waste incineration activity - LPG:
   - ➢ hourly fuel consumption
     - min. = 24.6 l/h
     - max. = 122.5 l/h
   - ➢ maximum no. of daily operating hours = **10 hours**[4]
   - ➢ estimated daily fuel consumption:
     - minimum = **10 hours** x 24.6 l/hour = 246 l/day
     - maximum = **10 hours** x 122.5 l/hour = 1225 l/day
   - ➢ estimated annual fuel consumption
     - minimum = 246 x 320 = 78720 l/year
     - maximum = 1225 l/day x 320 days/year = 392000 l/year
     - average = 150000 l/year
2. consumption for trucks serving the incineration of non-hazardous waste and medical waste (truck transport and forklift transport) - approx. 5 t/year

LPG will be supplied to the incinerator from tanks to be installed on site (total capacity 20,000 l) through a special piping system to transport it to the incinerator and then through the systems fitted to each burner.

LPG is supplied to the tanks by specialized tankers authorized by approved suppliers. The LPG is unloaded from the tanker into the tanks on site using special equipment provided.

The connection to the existing utility networks in the area is as follows:

Electricity supply will be achieved through overhead and underground connections to the existing installation on the location belonging to SC Friendly Waste Romania SRL, respectively from the local electricity distribution network. For this supply, the project "Connection to the electricity grid of the permanent consumption place - production hall" was elaborated, for which DEI no. 10130/17.05.2022 issued by APM Giurgiu was obtained.

[4] **normally in the incinerator combustion is initiated (with LPG) when the waste is fed into the incinerator and then the combustion is maintained by the heat input (self-sustaining combustion) from the incinerated waste. For this reason it was calculated that, in practice, for the operation of the incinerator for a period of 24 hours/day the LPG supply to the burners is only 10 hours/day on average**

In the event of a breakdown in the electricity supply network, the site will be equipped with a 100 KVA diesel generator. It will be equipped with a terminal engine with EURO 5 or 6 pollution standard. The running time of the generator will be limited by the time of completion of the incineration of the waste in the primary chamber at that time (with the waste supply switched off) after which it will stop waiting for the power supply to return from the grid.

Water supply:

The existing industrial water network on the site will be used. The execution of the borehole for the water supply to the site (maintained in the project title) has been abandoned because the existing water network on the site can provide all the technological water needs.

Bottled water will be used for the consumption of staff serving the activity.

The outdoor use installation will be made of PE pipe ID De 63...25, Pn10, in buried installation.

On the outdoor water supply system, to ensure the water supply flow for the car wash platform, the bin storage platform, the sanitation of the circulation areas, the irrigation of the green areas, 6 garden hydrants with discharge, Dn 50 mm, in buried installation have been installed.

For the estimation of the annual water consumption, in the operational phase of the objective, the calculation brief is presented below, in which all the necessary water consumptions are highlighted, respectively:

- water consumption for domestic purposes, for staff and technological needs in administrative areas (sanitizing floors, work areas, etc.);
- water consumption for technological/industrial use: washing cars and bins, washing/hygienization of halls and concrete platforms.

***Calculation abstract*[5]**

1. Determination of water supply flows

1.1. Determination of domestic water supply flows

1.1.1. Determination of water requirements for domestic consumption

The staff employed by the company is a maximum of 8 people, workers (4 drivers, 3 incineration plant service workers and 1 TESA person) who will work in a shift, 8 hours/day.

According to SR 1478, the specific water requirement for industrial enterprises, for one worker per shift, with category II technological processes, is 25 l/h x day.

Ngm = 25 x 3 = 75 l/day

The water requirement for technological needs (sanitizing floors, working areas, etc.) is about 30 l/day; Ngt = 30 l/day.

N = Ngm + Ngt = 105 l/day = 0.105 m3/day = 0.013 m3/h = 0.0036 l/s, for shift work, so 8 hours/day.

1.1.2. Determination of domestic water requirement

When determining the water requirement, account is taken of:

- the previously calculated water requirements;
- the system own technological needs;
- water losses in supply and distribution networks

Qs = Ks * Kp * N

Ks - coefficient that takes into account the technological needs of the treatment and purification system, the need to wash the networks.

Ks = 1.0, for public sources, connections, with treatment facilities.

Kp - super-unit coefficient, takes into account water losses in the supply and distribution network.

[5] The calculation brief has been taken from the memorandum "Water and sewage installations" - Calculation brief, prepared for the project under analysis, designer DM Fluid Proiect SRL

Kp = 1 - short supply network, distribution, no losses allowed.
Qs = 0.105 m3/day = 0.013 m3/h = 0.0036 l/s
Qs day med. = 0.105 m3/day = 0.013 m3/h = 0.0036 l/s
Qs day max. = K_{day} * Qs day med

K_{day} - coefficient, which takes into account the unevenness of daily consumption, on the day of maximum consumption.

K_{day} = 1.2
Qs day max. = 0.125 m3/day = 0.0157 m3/h = 0.0043 l/s
Qs hourly max. = K_{hourly} * Qs day max.

K_{hourly} - coefficient, which takes into account the unevenness of daily consumption, on the day of maximum consumption.

K_{hourly} = 1.4
Qs hourly max. = 0.0219 m3/h = 0.0061 l/s

For domestic consumption, the source will have to ensure the flow of the maximum hourly water requirement, i.e. 0.0219 m3/h = 0.0061 l/s

At the domestic wastewater discharge, the following flow rates (100% of the water supply flow rates, according to NP 133/2013) are recorded

Quz day med. = 0.105 m3/day = 0.013 m3/h = 0.0036 l/s
Qs day max. = 0.125 m3/day = 0.0157 m3/h = 0.0043 l/s
Qu hourly max. = 0.0219 m3/h = 0.0061 l/s

1.2. Determination of water supply flow rates for industrial use (car wash and bins)

1.2.1. Determination of technological water demand

Washing of cars and bins will be carried out with fully equipped manual pressure washers (washing robots).

The maximum washing capacity of this car wash is a maximum of one car at a time.

According to the aggregate technical book, the specific flow rate of a washing head is 0.1 l/s. For a car, with pressure washing, the average washing norm is 80 l/bu, maximum 6 cars/day.

Washing a car takes no more than 30 minutes. In conclusion, the washing aggregates will work for 3 hours for cars and 6 hours/day for bins.

According to STAS 1478, the calculation relationship for water distribution networks for technological purposes is as follows:

$Qt = \sum K * n * qs$
K - simultaneity coefficient, depending on the technological process
K = 1.05
n = number of consumption points
qt = 1.05 * 1 x 0.1 = 0.105 l/s.

1.2.2. Determination of technological water requirement

According to SR 1343/1 -95, for the calculation of the water requirement, for a conventional 8-hour calculation day, the relationship is used:

QSt = Ks * qt
qt = 0.105 l/s = 0.378 m3/h = 3.024 m3/day.
Ks = 1.0
Kp = 1.0
QSt = qt
QSt day med. = K * QSt
QSt day med. = 0.105 l/s = 0.378 m3/h = 3.024 m3/day, for a conventional day of calculation, 8 hours.
K_{day} = 1.30

QSt day max. = Kday * QSt day med.=1.1 *3.024 m3/day = 3.32 m3/day = 0.415 m3/h = 0.11 l/s.

QSt hourly max.=K hourly *KSt day max.=1.5* 0.415 = 0.622 m3/h = 0.172 l/s.

For technological consumption, the source will have to provide the required hourly maximum water flow, i.e. 0.622 m3/h = 0.172 l/s.

Corresponding to these values, the flows of wastewater, of technological nature, which reach the technological sewerage network, i.e. the sealed drain basin, are considered to be equal to the technological water supply flows, as follows:

- Quz tot day med = 3.479 m3/day = 0.434 m3/h = 0.120 l/s
- Quz tot day max = 4.67 m3/day = 0.583 m3/h = 0.162 l/s
- Quz tot hourly max = 1.408 m3/h = 0.391 l/s.
- The maximum total annual volume is 4.67 m3/day x 320 days/year = 1494.40 m3/year.

The flow of wastewater, of a technological nature, after passing through the petroleum products separator and the contact basin, will have, at the entrance to the sewerage network (after treatment in the on-site plant), the parameters established by NTPA 001, modified by GD 352/2005.

1.3. Determination of the flow rate of water supply for industrial use, used in the sanitation of the incinerator hall

1.3.1. Determination of technological water demand

The floor of the hall, where the incineration plant is mounted, will be sanitized with manual pressure washers with the addition of compressed air.

For the 315.85 m² of the hall, due to the similarity with similar technological processes, it is considered that 350 l of water are used daily.

Nsp hall = 350 l/day

1.3.2. Determination of the technological water requirement for the sanitation of halls

According to SR 1343/1 -95, for the calculation of the water requirement, for a conventional 8-hour calculation day, the relationship is used:

Ks = 1.0

Kp = 1.0

QSt ig = Nsp hall

QSt ig day med. = K * QSt

QSt ig day med. = 350 l/day = 0.35 m3/day = 0.043 m3/h = 0.012 l/s, for a conventional 8-hour calculation day.

Kday max = 3,5

QSt ig day max.= Kday*QSt day med.=3.5 *0.35 m3/day=1.225 m3/day = 0.153 m3/h = 0.042 l/s.

QSt ig hourly max.=K hourly *KSt day max.=5* 0.153 = 0.765 m3/h = 0.212 l/s.

For the technological consumption, the hall sanitation, the source will have to ensure the flow of the maximum hourly water requirement, i.e. 0.765 m3/h = 0.212 l/s.

Summing up the three flows of the water requirements, domestic and technological, the source will provide the flow of the total water requirement, which amounts to 1.408 m3/h = 0.391 l/s.

From the water supply, water flow will also be taken for irrigation of green spaces.

Corresponding to these values, the flow rates of wastewater, of a technological nature (sanitation of the hall floor) that reach the sewerage network, of premises, we consider to be equal to the flow rates of water supply, technological, thus:

Quz ig med. = 0.35 m3/day = 0.043 m3/h = 0.012 l/s

Quz ig max. = 1.225 m3/day = 0.153 m3/h = 0.042 l/s

Quz ig hourly max = 0.765 m3/h = 0.212 l/s.

The flow of wastewater, of a technological nature, after passing through the petroleum products separator and the contact basin, will have, at the entrance to the sewerage network (after treatment in the on-site plant), the parameters established by NTPA 001, modified by GD 352/2005.

1.4. Water supply flows, total:

Qs tot day med. = 3.479 m3/day = 0.434 m3/h = 0.120 l/s
Qs tot. day max. = 4.67 m3/day = 0.583 m3/h = 0.162 l/s
Qs tot hourly max = 1.408 m3/h = 0.391 l/s.

2. Wastewater flows, total, produced under this investment objective:

Total wastewater flows likely to be discharged to the on-site sewer system for a conventional 8-hour day:

Quz tot day med = 3.479 m3/day = 0.434 m3/h = 0.120 l/s
Quz tot day max = 4.67 m3/day = 0.583 m3/h = 0.162 l/s
Quz tot hourly max = 1.408 m3/h = 0.391 l/s.

The maximum total annual volume is 4.67 m3/day x 320 days/year = 1494.40 m3/year.

Sewerage:

Connection to the existing sewerage network on the industrial platform of the former chemical plant will be made.

The collection of the waste water flow from the car wash platform, resulting from the washing action, will be carried out with a grate gutter (longitudinal drain) with dimensions, in plan, of 6.0 x 0.35 m and maximum depth of 80 cm. In this gully, sand and soil, resulting from washing, will be collected.

The collection of the wastewater flow from the bin storage platform, resulting from the washing action, will be carried out with a prefabricated gutter, made of fibrobeton, type 1000x160x120 mm, 6 l.m. long.

The flow of technological wastewater collected from these platforms (car wash and bin storage) and from inside the production hall will be conveyed through a PVC pipe KG 110 mm, before reaching the industrial sewage network, through a mechanical pre-treatment and disinfection system (treatment plant), consisting of: manual rare grate, coarse grate, flocculant and disinfectant (sodium hypochlorite solution) dosing plant, settling plant and filtration plant with coalescence filter, Q = 5 l/s.

The flows of meteoric wastewater collected from roofs, waterproofed circulation surfaces, with a system of prefabricated concrete gutters, passed through a coalescing oil separator, Q = 5 l/s, V = 600 l and collected in a 10 m3 reinforced concrete collection basin, whose overflow will be connected to the sewerage network. These flows will be used to irrigate the green spaces, the premises and to wash the impermeable surfaces.

The domestic wastewater flow, collected from the production sites (changing rooms, administration, technical room) through a PVC pipe KG 32 mm to 110 mm, is conveyed to the sewerage network, PVC KG 110 mm and then to the manhole, downstream of the technological water contact basin.

The wastewater flows from the sanitation of the interior floors of the incinerator assembly hall will be collected by means of a 1000x160x120 mm fibrobeton roadway gutter system with cast iron grating, discharging into two 400 mm PE ID 400 mm inspection sewer manholes, which will convey the wastewater flows through a 110 mm PVC KG sewer network to the technological sewer network.

The indoor sanitary installations (hot and cold water) in the locker rooms, administrative office and technical room are made of composite polypropylene pipes, Dn 25 mm.

The hot water flow from the changing rooms is prepared in electrically operated 80-liter storage boilers.

The treatment plant of 417 l/h capacity, type CN 2C is designed by the company DAIKI in Japan and assembled by S.C. ASTEC ROMANIA S.R.L. The plant operates buried up to the manholes, in the vicinity of the sewage network capable of taking the flow of treated water, and is designed for protection against very low temperatures and against the emanation of unpleasant odours.

The plant is located on 2 cylindrical tanks with a total usable volume of approximately 17 cubic meters.

The plant consists of two separation and sedimentation compartments, a biological oxidation compartment with catalytic filters and aeration produced by the blower block and a sedimentation compartment.

The great advantage over other wastewater treatment plants is the adaptable design to the needs of the beneficiary and the easy operation, which only requires qualified personnel every 3 months.

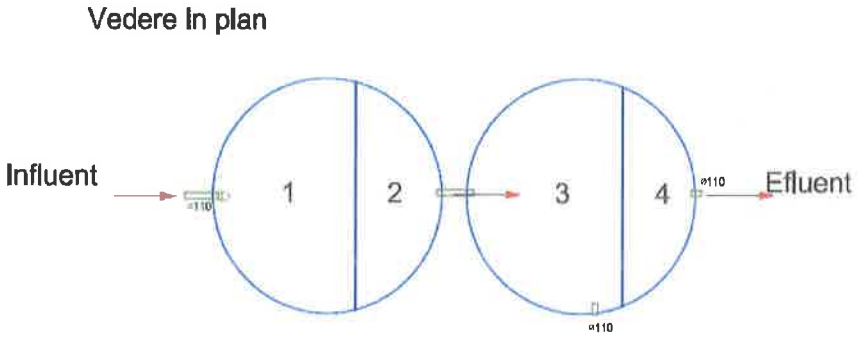


Figure 13 - Schematic diagram of technological objects operating the wastewater treatment plant

Legend:
1 - primary decanter no. 1
1 - primary decanter no. 1
3 - aeration basin
4 - secondary decanter

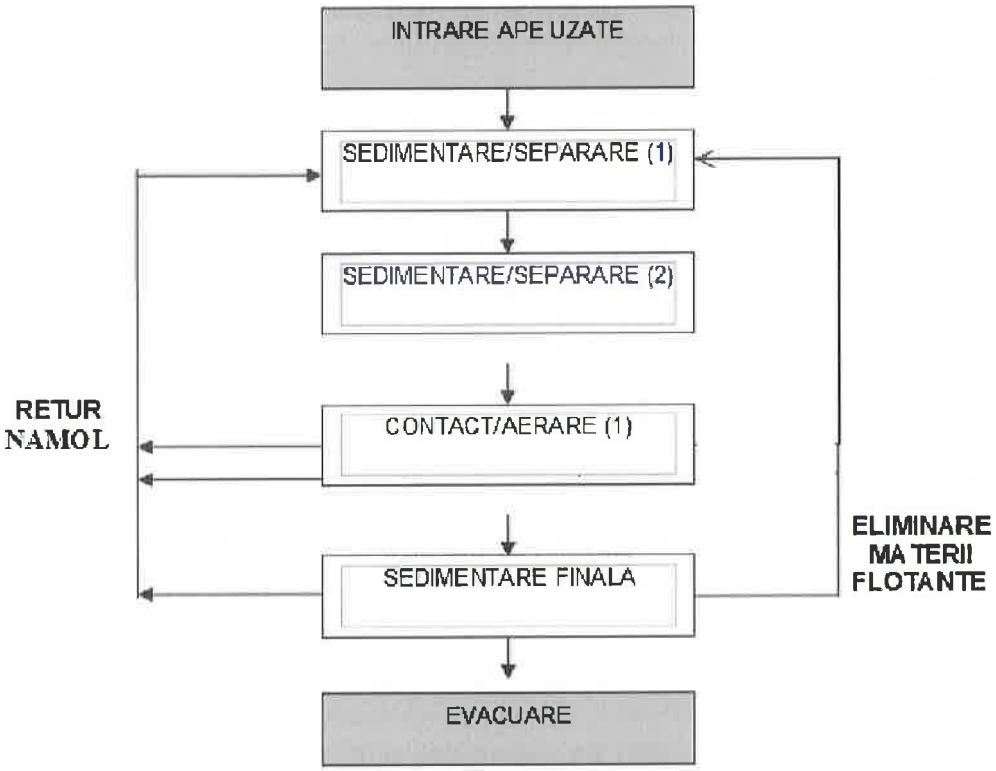


Figure 14 - Diagram of processes of wastewater treatment plant

Description of the operation of treatment plant:

The influent taken from the sewage network is introduced into the plant via the inlet pipe, after which it is coarse filtered to remove large bodies. Separation and sedimentation takes place gravitationally or by flotation in separation-sedimentation compartments 1 and 2, which also serve the purpose of anaerobic digestion as well as denitrification of recirculated sludge and storage of excess sludge.

Settling separation of suspended solids, including toilet paper from discharged sewage, promotes anaerobic digestion and denitrification of recirculated sludge from the final settler. The volume of the compartments and therefore the retention time of the wastewater is calculated to allow sedimentation of even very fine suspensions and storage of excess sludge for long periods of 6-12 months.

Compartment 3, with a volume equal to 0.6 - 0.8 of the average daily flow, performs aerobic digestion reduction of organic substances still in suspension through contact with microorganisms still formed on the catalytic honeycomb filters. An external blower produces aeration with an air volume large enough to optimise the biological oxidation process, proportional to the amount of CBO_5 in the treated water. Due to the phenomenon of thickening of the biofilm over time, which leads to a decrease in aerobic digestion efficiency, these compartments are also equipped with systems for removing excess still by removal with pressurised air and recirculation to the separation-sedimentation compartments.

Water from the sedimentation compartments is oxygenated by means of fine air bubbles supplied by diffusers and entrained in a controlled flow that uniformly washes away bacteria still on the honeycomb contact surface, so that optimal conditions for aerobic digestion are ensured.

The foam, which occurs mainly at the beginning of operation due to insufficient time for the biofilm to develop, is removed by spraying water from a shock tank located between the final decanter and the disinfection compartment, operated by an electric submersible pump whenever necessary. The sludge produced in this compartment as a result of bacteriological biodegradation, but also by regular

removal of excess biofilm with the cleaning device, is recirculated by a manually operated air pump to the first sedimentation basin, where denitrification takes place with the help of anaerobic bacteria present in the active sludge.

The sedimentation compartment sediments the solids from the aerobic digestion process in a volume of approximately 0.15 - 0.25 of the average daily flow. The sludge produced is recirculated to the primary compartments where the cycle is restarted.

Treated water in the contact compartment with aeration is transferred gravitationally to the final Hopper-type sloped-wall sedimentation compartment, and the supernatant is transferred to the disinfection compartment over the overflow threshold of the sawtooth spillway. Both sludge and excess foam are recirculated to the first sedimentation tank via air-driven pumps controlled by an electronic timer.

Disinfection compartment

The flow of clean water, but loaded with microorganisms, comes into contact with chlorine tablets in a device that allows the control of the contact time with the discharged water and therefore the chlorine content in the effluent. During the temporary retention in the compartment, the water is disinfected as a result of the destruction of microorganisms by the presence of chlorine, after which it is discharged by gravity or by re-pumping into the city sewer.

The only substances used are chlorine tablets (Biclosol) with an active chlorine content of 1.5 mg/tablet. Bearing in mind that 2 tablets/m^3 are recommended for the disinfection of drinking water in storage tanks and 20 tablets are used for disinfection activities for a maximum volume of industrial waste water of 10 m^3/day, so that the maximum permitted values for free residual chlorine of 0.2 mg/l discharged water are not exceeded.

The values of the indicators in domestic wastewater will be within the limits set in the G.D. 352/2005, NTPA 001.

Technical parameters:

- Maximum allowable flow rates for influent: 10 m3/day
- Discharge: into the sewage network of the former Giurgiu Chemical Combine, belonging to SC Delta Gas SRL
- BOD5 reduction yield - min. 91%
- CCO reduction yield Cr - min. 88%
- Yield of suspended matter reduction - min. 83%
- Installed power: max. 2.5 kW, 380 V
- Service staff: 1 temporary maintenance technician

The treatment plant is equipped with a chlorine tablet disinfection system.

Heat energy: Not applicable. The heating of staff areas will be provided by electrically powered fan convectors.

Summarising the above information, the information on the production to be achieved and the resources used to ensure production is shown in Table 8 below:

Table 8 - Information on production and resources used

Production		Resources used to ensure production		
Name of the process	**Estimated annual quantity**	**Name**	**Estimated annual quantity**	**Supplier**
Waste incineration	**2304 t/year**	Water	1494.40 c.m.	DELTA GAS COV SRL
		Electricity	314.24 MW	E-DISTRIBUȚIE MUNTENIA SA or other supplier
		Diesel	5 tonnes	PECO stations
		LPG	392 tonnes	Authorized supplier

The estimated annual quantities shown in Table 8 are the maximum quantities calculated.

2.4. ESTIMATION, BY TYPE AND QUANTITY, OF EXPECTED WASTE AND EMISSIONS

2.4.1. WATER POLLUTION

From the activity carried out by Friendly Waste Romania SRL on the analyzed location, domestic wastewater and technological wastewater are the result. The wastewater will be discharged into the existing industrial sewage system in the area and will be collected initially in the basin with V = 10 m3 to be placed on the site under consideration. From the basin, the wastewater will be taken by the pre-treatment station and discharged into the existing sewerage network in the area (DELTA GAS SRL).

Domestic waste water - Construction phase

The average number of staff involved in the construction work is 10.

The domestic wastewater will be collected in the basins provided in the ecological toilets and will be disposed of by the company providing the services for the authorized contractor.

The pollutants discharged daily into domestic wastewater and their quantities are shown experimentally in the table below.

Table 9 - Average experimental wastewater composition for the construction period

Parameter	Load (g/person/day)	Concentration (mg/liter)	Total load for 10 persons (kg/day) minimum and maximum limit	
Total solid objects	115-170	680-1000	1.150	1.700
Volatile solid objects	65-85	380-500	0.650	0.850
Suspended solid objects	35-50	200-290	0.350	0.500
Suspended volatile solid objects	25-40	150-240	0.250	0.400
CBO5	35-50	200-290	0.350	0.500
CCOCr	115-125	680-730	1.150	1.250
Total nitrogen	6 – 17	35-100	0.060	0.170
Ammonium	1 – 3	6 - 18	0.010	0.030

Nitrites, nitrates	<1	<1	<1	<1
Total phosphorus	3 - 5	18-29	0.030	0.050
Phosphates	1 - 4	6 - 24	0.010	0.040
Coliform. total	-	1010-1012	-	-
Faecal coliform	-	108-1010	-	-

Period of exploitation/operation of the target

Eight people will be employed for the exploitation period. They will work in shifts to cover a 24 hour/day working schedule. The loadings for the 8 new employees for domestic wastewater are shown in the table below:

Table 10 - Domestic waste water load related to staff during the period of operation

Parameter	Load (g/person/day)	Concentration (mg/liter)	Total load for 8 persons (kg/day) minimum and maximum limit	
Total solid objects	115-170	680-1000	0.92	1.36
Volatile solid objects	65-85	380-500	0.52	0.68
Suspended solid objects	35-50	200-290	0.28	0.4
Suspended volatile solid objects	25-40	150-240	0.2	0.32
CBO5	35-50	200-290	0.28	0.4
CCOCr	115-125	680-730	0.92	1
Total nitrogen	6 – 17	35-100	0.048	0.136
Ammonium	1 – 3	6 - 18	0.008	0.024
Nitrites, nitrates	<1	<1	<1	<1
Total phosphorus	3 - 5	18-29	0.024	0.04
Phosphates	1 - 4	6 - 24	0.008	0.032
Coliform. total	-	1010-1012	-	-
Faecal coliform	-	108-1010	-	-

Estimation of the values of domestic wastewater loads resulting from the activity of S.C. Friendly Waste Romania S.R.L. on the analyzed location was achieved by corroborating the average number of inhabitants in relation to the number of hours with the values of the "Average composition of domestic wastewater (Imhoff - 1990) in g/place/day".

Technological waste waters

The technological waste waters are generated only during the operational phase of the site, from:

- washing the bins and the bodies of vehicles that will transport animal waste;
- washing of the concrete platforms in the loading area of the waste incinerator. The frequency of washing will be about once a week and low flow pressure washing equipment will be used.

- washing of the concrete platform intended for unloading and possible temporary storage of non-hazardous waste. The frequency of washing will be about once a week and low flow pressure washing equipment will be used.

Analyzing the water loadings based on the results of analyses carried out at other sites with the same activity, in conjunction with the volumes of industrial wastewater expected to be generated at the site under analysis, the results are shown in the table below:

Table 11: Estimated loadings to process water during the operational period of the objective

Parameter	Analysis report values	M.U.	Estimated maximum volume for domestic waste water m^3			Maximum volume loads kg			VLA according to NTPA 002/2005	VLA according to NTPA 002/2005
			daily	monthly	annually	daily	monthly	annually		
pH	6.70	unit. pH	3.479	104.37	1494.4				6.5 – 8.5	6.5 – 8.5
Total suspended solids	30	mg/l				0.144	3.072	36.86	350	35
CCOCr	120	mgO_2/l				0.576	12.288	147.456	500	125
CBO_5	42	mgO_2/l				0.202	4.3	54.13	300	25
Ammonium	8.74	mg/l				0.042	0.895	11.26	30	2
Total phosphorus	0.89	mg/l				0.0043	0.091	1.147	5	1

The values of the indicators in domestic wastewater will be within the limits set in the G.D. 352/2005, NTPA 001.

The operation of the dry absorbing system does not result in waste water, as it is a dry system.

2.4.2. AIR POLLUTION

Sources and pollutants generated during the achievement of the objective

At this stage there will only be mobile sources of pollution, not stationary sources.

The sources of air pollution during the incinerator and mobile construction works are the machinery and means of transport carrying out the works:

- transport of components of mobile buildings
- transport of incinerator components
- loading - unloading of the components of the mobile buildings and the incinerator
- construction of anchoring foundations (blocks of sleeves)
- incinerator assembly
- assembly of mobile constructions

The machinery and means of transport to be used are:

- crane
- heavy goods vehicles
- heavy goods vehicles

All of them are equipped with diesel engines. The characteristic pollutants are:

- sulphur dioxide:
- carbon monoxide
- nitrogen oxides
- persistent organic pollutants (POPs)

- heavy metal compounds (especially cadmium) in exhaust gases

Sources and pollutants generated during operation of the target

Activities that will generate sources of air pollution are those related to:

- waste incineration
- combustion of fuel (LPG) in the incinerator
- on-site traffic (vehicles entering and leaving the site carrying waste for disposal on site, removal of ash and waste from the site, internal transport)

The characteristic pollutants are:

- sulphur dioxide:
- carbon monoxide
- nitrogen oxides
- persistent organic pollutants (POPs)
- heavy metal compounds (especially cadmium) in exhaust gases

Facilities for the containment, discharge and dispersion of pollutants in the environment are:

For mobile sources - all vehicles and machinery that will be used, both during the project implementation phase and during operation, will be equipped with low emission engines, according to national standards harmonized with European standards.

For stationary sources - the incinerator to be installed and commissioned, the IE 1000R-300 Incinerator, is equipped with:

- secondary combustion chamber with features:
  - V = 9.7 m3 equipped with 1 burner to burn the flue gases from the primary chamber
  - secondary combustion chamber temperature - 1100°C
  - gas retention time in the secondary combustion chamber - 2 seconds
- dry absorbing flue gas cleaning/washing system comprising:
  - flue gas cooling system;
  - dry absorbing system for flue gas cleaning;
  - dry particle filtration system;
  - exhaust fan for exhausting combustion gases;
  - flue gas chimney and chimney connector with features:
    - height H = 10 m
    - diameter Ø =0.5 m
    - the outlet area S = 0.196 m^2.

2.4.3. SOIL AND SUBSOIL POLLUTION

Possible sources of soil pollution are:

- possible accidental spillage of fuels or lubricants from vehicles and machinery servicing the construction activity and then from specific activities during the incinerator operation phase
- possible accidental spillage of fuels or lubricants from the vehicles and machinery servicing the incinerator operation

Bearing in mind that the waste to be brought to the site for incineration is:

- transported in containers or bins
- by their nature these wastes do not have a liquid composition with the potential to pollute the soil

- they shall only be handled under controlled conditions by well-trained personnel
- the entire waste handling process will be carried out exclusively on concrete platforms

This waste will not be a soil pollutant.

Measures, facilities and arrangements for soil and subsoil protection

The following measures have been foreseen to avoid soil pollution:

- the functionality of the thermal engines of the vehicles used for construction work shall be checked in due time
- no fuel and oil depots are set up in places other than those equipped in accordance with legal requirements;
- maintenance and repair works on machinery and means of transport shall be carried out only in specially designated places;
- no washing of machinery and vehicles shall be carried out on the premises, with the exception of washing for the sanitation of means of transport of non-hazardous animal waste;
- the supply of diesel and lubricants to machinery is carried out under all conditions to avoid accidental losses and to protect the environment in specially equipped places - fuel distribution stations;
- all machinery and vehicles used in the construction work and then in the incineration work run on designated roads and are parked only on concrete platforms
- waste for incineration shall be temporarily stored only in special containers in specially designated areas
- the waste from the incineration process is collected in special containers in an appropriate area.

2.4.4. NOISE AND VIBRATIONS

The project to be implemented does not constitute a significant source of noise or vibration.

During the implementation of the project, i.e. the construction of the metal hall and the location of the incinerator, noise and vibrations will be produced, but their level will not cause discomfort to the population, especially as the objective is located at a great distance from residential areas.

2.4.5. LIGHT, HEAT, RADIATION

The project to be implemented does not constitute a source of radiation.

The flue gas from the incinerator exhaust stack can reach a temperature of 80°C.

2.4.6. QUANTITIES AND TYPES OF WASTE PRODUCED DURING THE CONSTRUCTION AND OPERATION PHASES

Waste from the construction phase

The management of waste produced during the construction phase will be subject to site organization in accordance with the legislation in force. The following types of waste are expected:

- household or similar;
- ferrous metal - resulting from the activity of execution of metal structures
- non-ferrous metal - resulting from the work of building indoor electrical networks;

- soil and stones - excavation/digging results;
- concrete - from the breaking of the existing platform and the creation of foundations and platforms

According to the provisions of the Government Emergency Ordinance No. 92/2021 on the waste regime, Art. 17, para. (4), "*the holder of the construction/dismantling permit issued by the local, central public administration authority or by the institutions authorized to authorize construction works of a special nature is obliged to have a waste management plan for construction and/or demolition activities, as appropriate, establishing sorting systems for waste from construction and demolition activities, at least for wood, mineral materials - concrete, brick, sandstone and ceramics, stone, metal, glass, plastic and gypsum for on-site recycling/reuse, as far as economically feasible, environmentally sound and safe construction, and to take measures to promote selective demolition to enable the safe disposal and handling of hazardous substances to facilitate high quality reuse and recycling through the disposal of non-valuable materials*".

The objectives of the waste management plan are:

1. prevention or reduction of waste generation and its harmful effects - these aspects have been taken into account in the technical design of the shopping centre and justified as efficient both in the excavation processes for the execution of the foundation works, in the processes of placing the networks and above-ground structures and in the restoration of the site in terms of environmental protection after completion of the works.
2. encouraging the recovery of waste resulting from the construction activities of the shopping centre through recycling, recovery or reuse, where this activity is environmentally viable - in this respect, a clear programme has been drawn up for waste sorting throughout the construction period, its selective collection, its channelling to authorized economic agents for recycling and/or recovery.
3. ensuring the safe disposal of waste that is not suitable for recovery and/or recycling, taking into account from the design stage the correct management of waste during the construction works - waste from construction activities will be temporarily stored in specially designed areas to prevent pollution of environmental factors (on ballasted platforms or in special containers on ballasted platforms) until it is taken over for disposal by authorized companies.

Given that there are no constructions on the site where the project is to be implemented that require demolition activity, the plan will only be carried out for the waste that will result from construction activities.

Their management, in accordance with the provisions of GEO 92/2021, are centralized in the table below:

Table 12 - Estimated quantities of waste resulting from the construction phase

Waste type	Waste code*	Source of generation	Storage/stocking method	Proposed waste disposal/recovery	Estimated quantities
Metal waste	17 04 05	Location of metal structures for construction	Concrete platform	It is recovered by authorized economic agents	0.5 t
Electric cable waste	17 04 11	Construction of electrical networks and connections	Concrete platform	It is recovered by authorized economic agents	0.1 t

Household wastes	20 03 01	Activity of staff employed	Eurobins placed on the platform	It is eliminated by economic agents authorized by Giurgiu Local Council	2 c.m.
Soil and stones other than those mentioned in 17 05 03	17 04 04	Excavation/digging, land levelling	Concrete platform	Used as backfill when levelling the ground	14 c.m.
Concrete	17 01 01	Breaking of existing concrete platform/building foundation, creation of foundations, concrete platforms	Concrete platform	As a filler or recovered by authorized economic operators	2.8 c.m.

Waste from the exploitation phase

The waste resulting from the exploitation phase is listed in the table below:

Table 13 - Waste generated in the exploitation phase

Waste name	Estimated quantity to be generated t/year	Waste code*	Source of generation	Storage/stocking method	Proposed waste disposal/recovery
Paper - cardboard packaging	0.5	15 01 01	collective packaging resulting from the unpacking of by-products collected from the generators	Plastic bin	It is recovered by authorized economic agents
Plastic packaging	0.5	15 01 02	collective packaging resulting from the unpacking of by-products collected from the generators	Plastic bin	It is recovered by authorized economic agents
Wood packaging	0.1	15 01 03	collective packaging resulting from the unpacking of by-products collected from shops	Concrete platform	It is recovered by authorized economic agents
Metal packaging	0.2	15 01 04	collective packaging resulting from the unpacking of by-products collected from shops	Metal container	It is recovered by authorized economic agents
Absorbents contaminated with hazardous substances	0.01	15 02 02*	cases of accidental pollution	Metal container	It is disposed by authorized economic agents
Filter bags	0.07	15 02 03	bag filtration system	Metal container	It is disposed by authorized economic agents
Ferrous materials removed	0.1	19 01 02	incineration of medical waste containing metals	Metal container	It is recovered by authorized economic agents

from bottom ash					
Ash	1.5	19 01 11* bottom ash and slag containing hazardous substances	incinerator	Containers with a capacity of 1100 l	It is disposed by authorized economic agents
Ash	37.5	19 01 12 flue-gas dust and slag other than those mentioned in 19 01 11*	incinerator	Containers with a capacity of 1100 l	Disposal by authorized economic operators to the authorized non-hazardous waste landfill serving the area
Ash	0.5	19 01 12 flue-gas dust and slag other than those mentioned in 19 01 11*	bag filtration system	Containers with a capacity of 1100 l	Disposal by authorized economic operators to the authorized non-hazardous waste landfill serving the area
grease and oil mixture from oil/water separation other than those mentioned in 19 08 09	0.1	19 08 10*	cleaning the hydrocarbon separator	will be collected in sealed containers by the company that will clean the separator	It is disposed by authorized economic agents
sludge from the sewage treatment plant	0.5	19 08 12	operation of the treatment plant	metal container	It is disposed by authorized economic agents
Household wastes	12 c.m./year	20 03 01	Administrative, staff activity	Eurobins placed on the platform	It is eliminated by economic agents authorized by Giurgiu Local Council

2.5. Rules for waste incineration

In order to streamline the technological process of waste incineration on the site under consideration, the following rules, inter alia, shall be observed during the operational phase;

1. waste incineration will be carried out on the basis of an incineration programme/plan to be drawn up by the responsible person (or consulting company) with experience in this field
2. waste will be incinerated in separate categories (hazardous or non-hazardous medical, animal, etc.)
3. in certain cases and on the basis of an analysis of the waste records (waste characteristics) intended for incineration, mixtures of waste may be incinerated on the basis of their compatibility and calorific values
4. never mix categories or batches of waste that are not chemically or calorifically compatible
5. sludge intended for incineration must have a minimum dryness of 40%.

3. DESCRIPTION OF FEASIBLE ALTERNATIVES

According to the general guidelines applicable to the stages of the environmental impact assessment procedure (Annex 1 of the M.M.A.P. Order no. 269/2020), alternatives are different ways of carrying out the project to achieve the agreed objective. Alternatives can take various forms and range from minor adjustments to the project to a complete re-imagining of the project.

The guide also states that the identification and consideration of alternatives can provide a concrete opportunity to adapt the project design to minimize environmental impacts and thus minimize the significant environmental effects of the project.

The number of alternatives to a proposed project is, in theory, infinite, as the Directive does not specify how many alternatives should be considered. The number of alternatives to be assessed should be considered together with the type of alternatives, i.e. "reasonable alternatives".

The costs of the proposed monitoring measures to avoid, prevent, reduce or eliminate significant adverse effects should also be taken into account when analyzing alternatives, as they may make the project economically unfeasible.

Finally, the alternatives must be capable of achieving the project objectives in a satisfactory manner and should also be feasible in terms of the technical, economic, political and other criteria relevant to the project context.

Feasible alternatives may consider:

- the technology used: from a technical/technological point of view, the project owner has chosen the best option available at the moment, given the very high costs of implementing the project;
- protection of environmental factors: the incinerator will be equipped with the latest technologies for the protection of environmental factors, with low emissions;
- location/site: the incinerator will be located on an industrial platform where in the past industrial activities specific to a chemical plant were carried out; we consider the choice of the location in an industrial area better than the option of locating the incinerator in a location with other uses; also the distance from protected areas, defined in the Rules of hygiene and public health on the living environment of the population, approved by Order of the Minister of Health No. 119/2014, with further amendments and completions, is favorable to the implementation of the project in the proposed location.

Evaluation of the "do-nothing" scenario or 0 alternative

The "Do-nothing" or "no project" scenario describes what would happen if the project is not implemented at all. This option is not recommended because:

- as the area economy and trade develop, more and more animal and medical waste is generated and has to be disposed of by incineration;
- changes in the waste incineration market have taken place recently, leading to a decrease in incineration capacities at national and local level;
- in many cases, existing incinerators have outdated technologies and no additional equipment to protect the quality of environmental factors.

Incineration is the most effective method, from a public health and environmental point of view, for the disposal of medical and non-hazardous waste for which there are no alternative recycling/recovery options.

4. DESCRIPTION OF RELEVANT ASPECTS OF THE CURRENT STATE OF THE ENVIRONMENT

4.1. ASPECTS OF THE CURRENT STATE OF THE ENVIRONMENT

WATER - HYDROGEOLOGICAL CONDITIONS OF THE SITE

According to the General Urban Plan of Giurgiu Municipality, it is bordered to the south-east, for a distance of 7.3 km, by the Danube River. Its average flow rate is approx. 5600 m3/s, reaching more than 10,000 m3/s in spring after snow melt. At present, the canals Cama and Sfantul Gheorghe start from the Danube, in the right side of the municipality, as well as the Smârda and Ara arms, downstream of the town. From the former Veriga arm, initially modified in 1905 by the construction of the harbour in Ostrov Ramadan and later, in the penultimate decade of the 20th century by the location of the Chemical Combine, there are still three still water meshes. The rest of the puddles are preserved in Ostrovul Cioroiu (Lake Neamtului), Mocanu Island (Lake Lung and Lake Mare) to the west of the canal Sfantul Gheorghe, right at the connection with the river and to the west of Smarda arm (Lake Ciobanasul). The total area of the water body is 423 ha, representing 8.54% of the existing administrative territory.

AIR

Climate

There are a number of climate genetic factrors that influence the distribution on the globe, these being represented by solar radiation, general circulation of air and active subiacent surface.[6]

At the level of the general circulation of the atmosphere there are four expression forms with consequences on the Romanian climate, namely Western circulation, polar circulation, tropical circulation and locking circulation, the highest dominance of which being the Western circulation.[7]

In terms of active area , the most important role is played by relief, as it influences climatecharacteristics. The diversity of the regional landforms influences several climate types : mountain climate , hill and foothill climate, lowland climate and coastal climate.[8]

In this sense, with the exception of the coastal climate, all climate types are found within the South East Region climate types influenced by the variety of relief units present in the region.

The climate of the South East Region is in line with the general characteristics of a moderate temperate continental climate of transition, with a number of local particularities due to certain factors (relief, Black Sea, Danube).

The territory of Giurgiu County belongs entirely to the sector with continental climate (the climatic region of the Romanian Plain). Due to the homogeneity of the lowland relief, the general climatic regime is characterized by an evident homogeneity, expressed by very hot summers with low rainfall, mostly in the form of showers, and by relatively cold winters sometimes marked by strong blizzards, but also by frequent periods of warming, which cause discontinuities. in the southern extremity, where the studied site is located, the specific topoclimate of the Danube plain is individualized, with warmer summers and milder winters than in the rest of the plain.

The general circulation of the atmosphere is characterized by high frequencies of warm-oceanic air advects from the W and NW (especially in the warm semester) and warm-continental air advects from the NE and E (especially in the cold semester). To these are added less frequent inflows of Arctic air from the N, tropical-maritime air from the SW and S, and tropical-continental air from the SE and S. Air temperature shows a slight decrease oriented from SE to NW, following the general decrease in global mean solar radiation amounts.

[6] Geography of Romania, vol. I, 1983
[7] ibidem, 1983
[8] ibidem, 1983

Average temperature and precipitation[9]

The annual variations of these parameters are shown in the figures below.

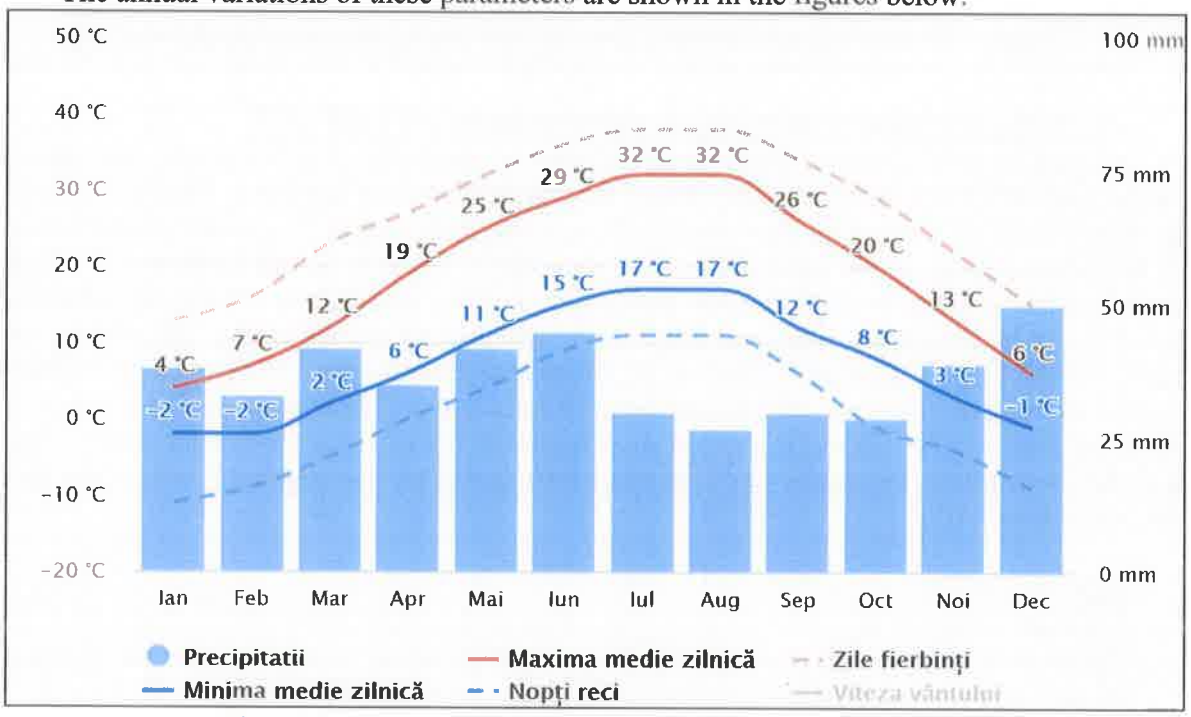


Figure 15 - Modeling annual variation for temperature and precipitation

"Average daily maximum" (solid red line) shows the average maximum temperature of a day for each month for Giurgiu. Also, the 'average daily minimum' (solid blue line) shows the average minimum temperature. Warm days and cold nights (blue and red dotted lines) show the average of the warmest day and coldest night of each month over the last 30 years.

[9] source - meteoblue

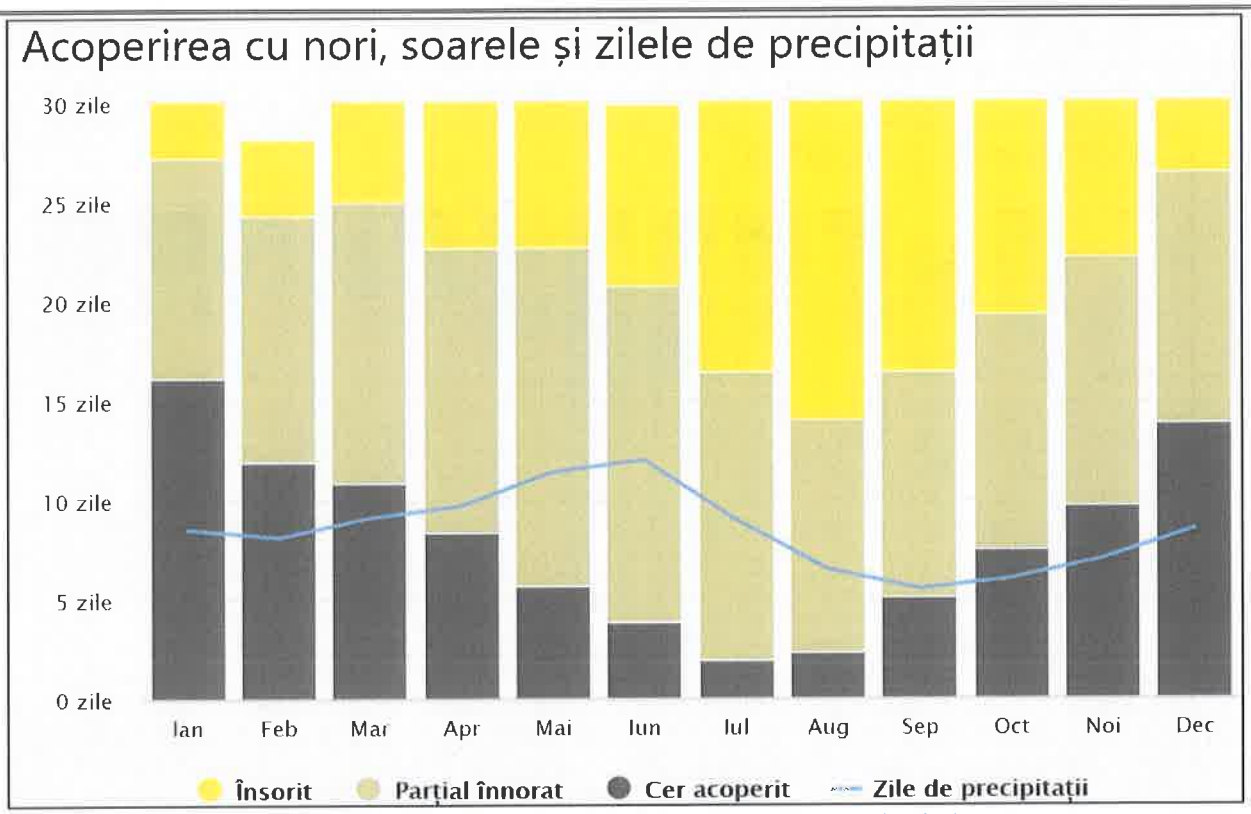


Figure 16 - Modeling annual variation in sunshine and nebulae

The graph shows the monthly number of sunny, partly cloudy, cloudy and rainy days. Days with less than 20% cloud cover are considered sunny, those with 20-80% cloud cover as partly cloudy and those with more than 80% as cloudy.

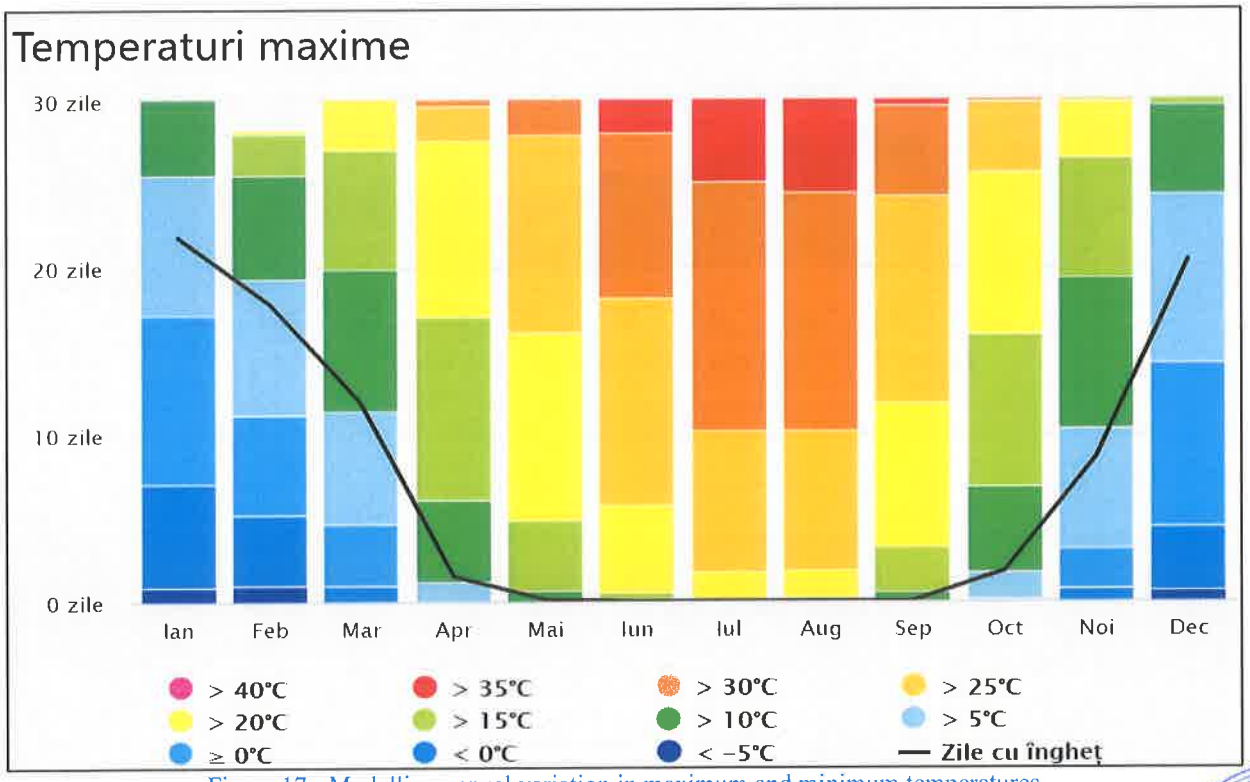


Figure 17 - Modelling annual variation in maximum and minimum temperatures

The maximum temperature chart for Giurgiu shows how many days per month certain temperature values are reached.

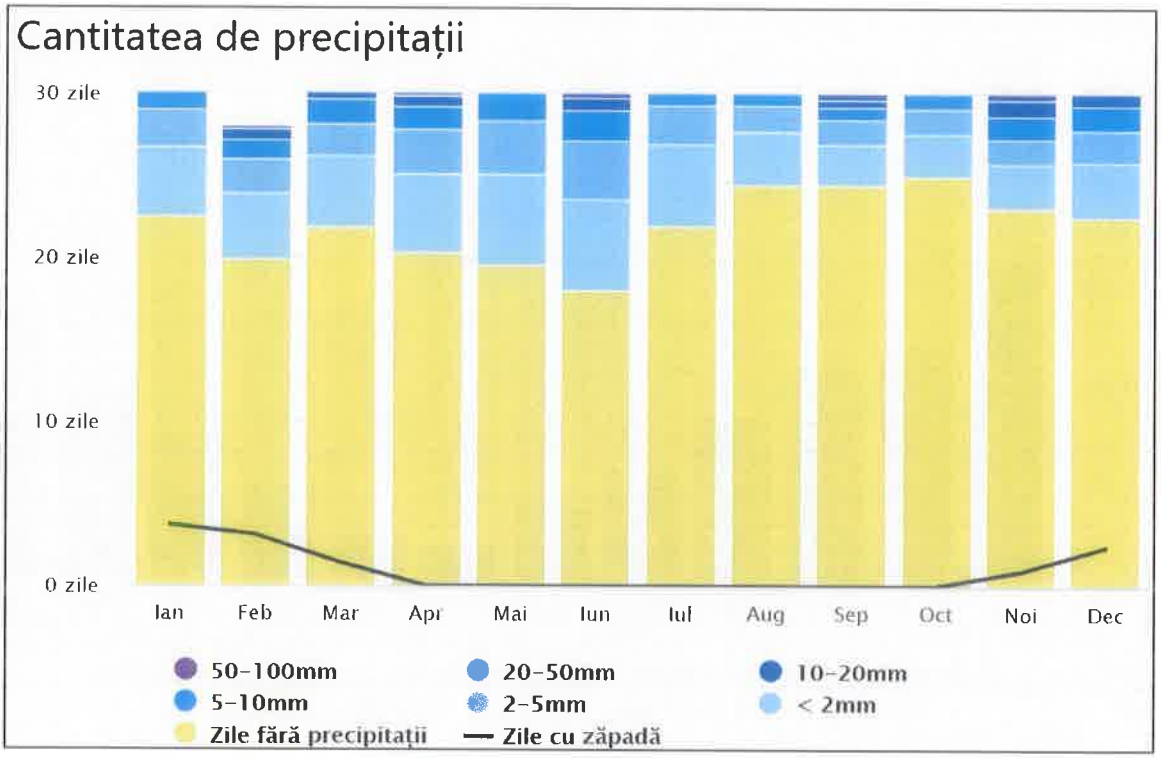


Figure 18 - Modelling the annual variation of precipitation amounts

The precipitation diagram for Giurgiu shows how many days per month a certain amount of precipitation is reached.

Wind regime[10]

Annual wind frequency by direction[11]

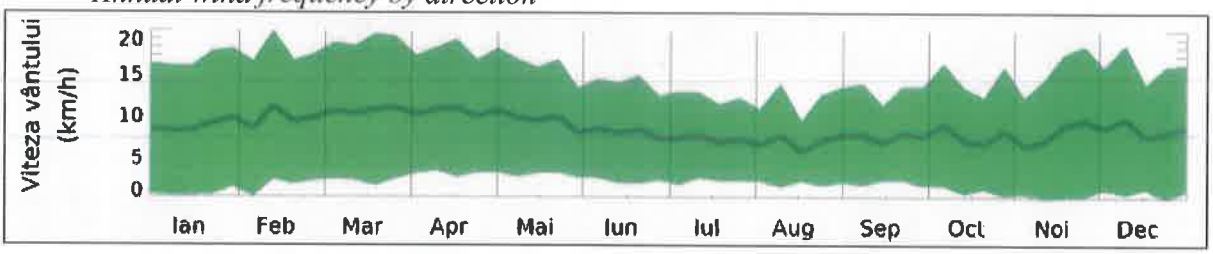


Figure 19 - Wind speed variation recorded at 1km from Giurgiu

[10] Reports on the state of environmental factors
[11] source - meteoblue

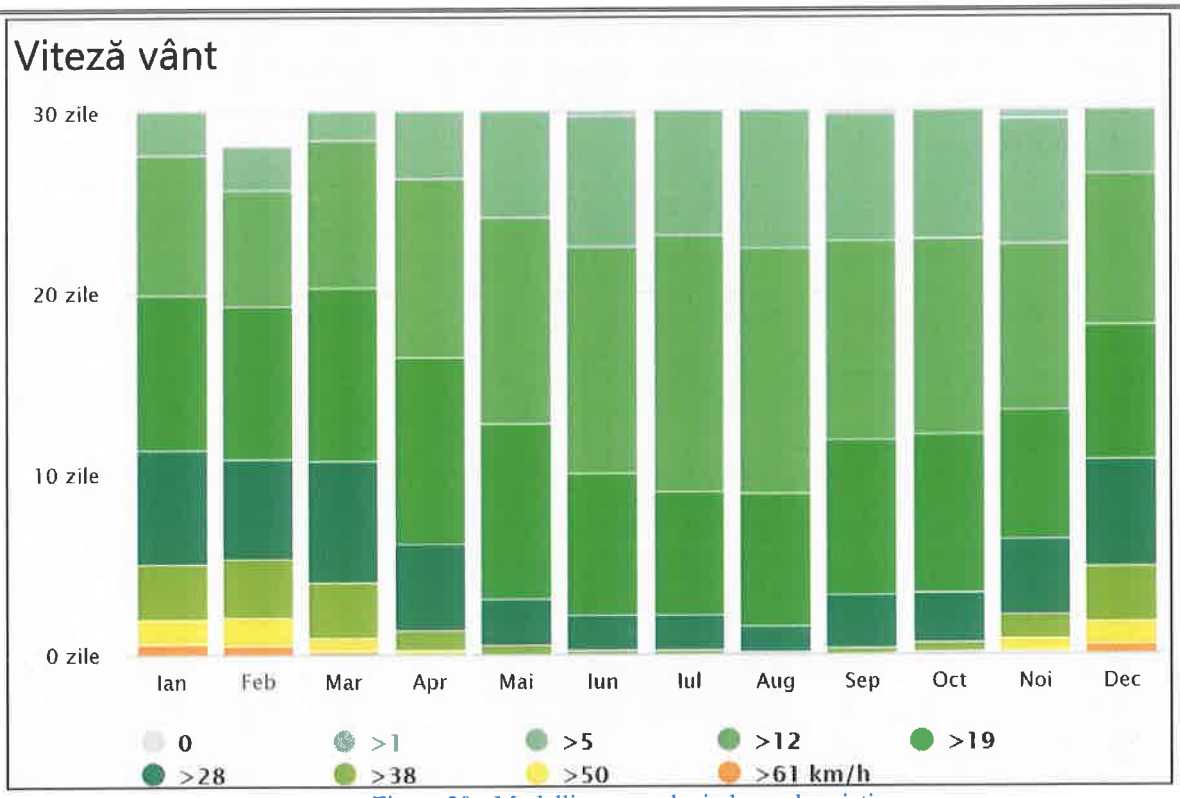


Figure 20 - Modelling annual wind speed variation

The chart for Giurgiu shows the days of the month when the wind reaches a certain speed.

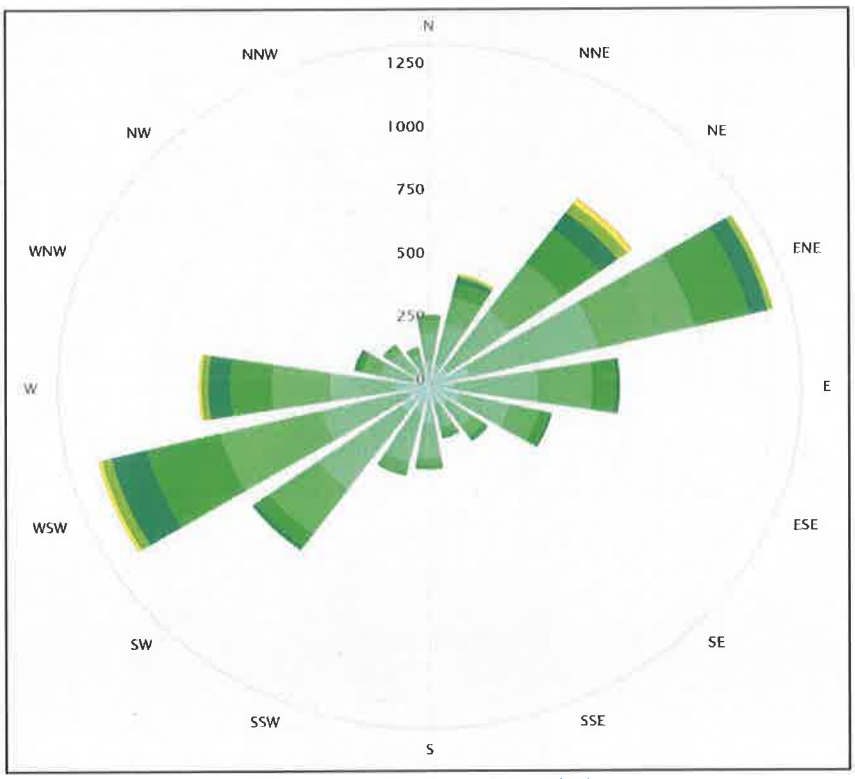


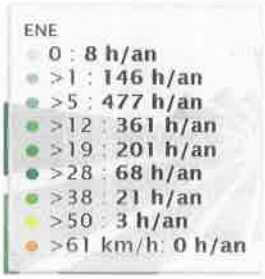
Figure 21 - The dew of the winds

The wind rose for Giurgiu shows how many hours a year the wind blows from the indicated direction. Example SV: The wind blows from the South-West (SW) to the North-East (NE).

It can be seen that the predominant directions are:

- WSW

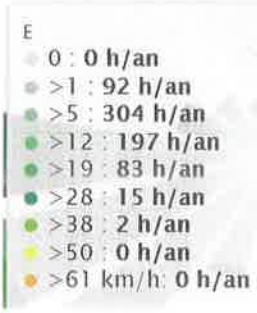
- ENE



- NE

- SW

- W



Frequency of calm

The frequency of calm in Giurgiu county is relatively low due to the geographical location of the county which determines the high frequency of winds from the WSW and N, NE.

Atmospheric calm is caused by the persistence of stable air masses, which allows pollutants to concentrate over localities and thus increase air pollution.

Relationship between wind regime and air quality

The evolution of pollutants in the air environment is the result of transport processes in which the transfer of pollutants (mass and energy transfer) takes place through mechanical actions such as diffusive-convective and dispersion. The physical analysis of air pollution phenomena is primarily concerned with the diffusive characteristics, dispersive power and dilution capacity of atmospheric air. All these diffusive-dispersive characteristics of the atmosphere have been generically referred to as the diffusivity of the atmosphere, i.e. the specific capacity of the area in question to self-purify through the dispersion of noxae (M. Marcu, 1983).

The ability of the atmosphere to disperse pollutants (the diffusivity of the air) is meteorologically determined by those physical parameters that define the dynamic and thermal state of the atmospheric air: air motions and the vertical thermal gradient, i.e. wind, vertical convective currents and atmospheric turbulence, and the thermal stratification of the lower tropospheric layer (the boundary layer).

Wind plays an important role in transporting pollutants. It can intensify the pollution action or, on the contrary, clean the urban atmosphere. The wind direction influences favourably or unfavourably depending on a number of natural and anthropogenic factors: shape, size, location of the city in relation to pollution sources, nature and intensity of emissions and geographical location.

The wind contributes to the dispersion of pollutants at greater or lesser distances from the source depending on its direction and speed, and in calm conditions, pollutants settle near the source.

Wind speed is also of particular importance in the diffusion of pollutants, as their concentration is inversely proportional to wind speed.

SOIL AND SUBSOIL GEOLOGY

Soils are a particularly important issue for sustaining agricultural activities and for the development of economic activities in general. Their total surface area and the structure of soil types are defining parameters for analyzing the development potential of a county.

The formation and evolution of soils typical of Giurgiu is related to climatic, biological, lithological, morphological and temporal factors. Characteristic soil types are alluvial protosols and alluvial soils, formed under mesic meadow and shale forest conditions, where the predominant parent material is alluvial or alluvioproluvial deposits, generally lacking structure. The phreatic overburden of the lithological material and soil is specific to the area and its effect is the gelling of some horizons, sometimes producing the phenomenon of swamping.

Figure 22 - Soil types in the study area (Source: atlas.anpm.ro)

Legend

Tipuri de soluri (SRCS)

- Soluri bălane
- Cernoziomuri cambice
- Soluri cernoziomoide
- Rendzine
- Soluri castanii
- Soluri brune argiloiluviale
- Soluri brune-luvice
- Planosoluri
- Soluri roşii (Terra rossa)
- Soluri brune feriiluviale
- Soluri negre acide
- Andosoluri
- Soluri negre clinohidromorfe
- Soluri gleice
- Solonceacuri
- Vertisoluri
- Soluri aluviale
- Psamosoluri
- Nisipuri
- Erodisoluri
- Lacuri si bălţi
- Limnisoluri
- Cernoziomuri
- Cernoziomuri argiloiluviale
- Soluri cenuşii
- Pseudorendzine
- Soluri brun-roşcate
- Soluri brun-roşcate luvice
- Luvisoluri albice
- Soluri brune eu-mezobazice
- Soluri brune acide
- Podzoluri
- Soluri humicosilicatice
- Soluri pseudogleice
- Soluri gleice semisubmerse
- Lacovişti
- Soloneţuri
- Stâncărie
- Regosoluri
- Protosoluri aluviale
- Litosoluri
- Soluri turboase
- Mlaştini
- Teren urban

From a geomorphological point of view, the area in which the objective is located is part of the large structural unit called the Romanian Plain - subunit "MOESICA Platform", characterized by a relatively flat relief, bordered by several streams and wide valleys. As a microzone, the landforms of

Giurgiu Municipality are mainly the meadow and the lower terrace on the left bank of the Danube River and the contact with the high area of the Burnas Plain.

Lower terrace

The Lower Danube Terrace area is the area on which Giurgiu Municipality is largely developed, including future expansion areas (zones I and II mentioned above). Within the lower terrace three characteristic areas can be delimited, namely:

•The lower terrace itself with 20 - 25 m (Black Sea)

•Depression zone identified within the lower terrace proper, with elevations ranging from 15.00 - 20.00 m (Black Sea)

•The high area developed at the contact with the meadow and having elevations between 23 - 32 m (Black Sea).

Meadow area

The meadow area develops mainly in the southern part of Giurgiu Municipality and generally has a depth of 16 - 18 m (Black Sea). In this area the industrial part of Giurgiu developed (shipyard, chemical plant). It should be mentioned that along the Danube and the Smarda arm a dyke was built to defend the city against flooding by the Danube waters (the western area - zone III mentioned above). Geologically, deep prospecting boreholes have revealed formations attributed to the following geological ages:

- The Permian (ca.3000 m depth) is represented by alternating marls, grey marls, sandstones and reddish grey clays

- The Triassic (between 1300 and 3000 m depth) is represented at its base by an alternation of clays and marly clays, followed by reddish siliceous sandstones over which greyish-white limestones and dolomites have been deposited. At the upper part marls and greenish grey marly clays were intercepted.

- The Jurassic (between 1300 and 3000 m depth) is represented by grey sandstones and sands, blackish clayey siltstones, followed by brecciated limestones and dolomites at the bottom.

- The Cretaceous is represented by marly limestones (cca. 50 m thick) over which oolitic micro-detritic limestones interbed. At the top glauconitic sandstones, marl - limestones and grey marls intercept.

- The Quaternary is represented by alluvial deposits over which loessosoid soils were deposited.

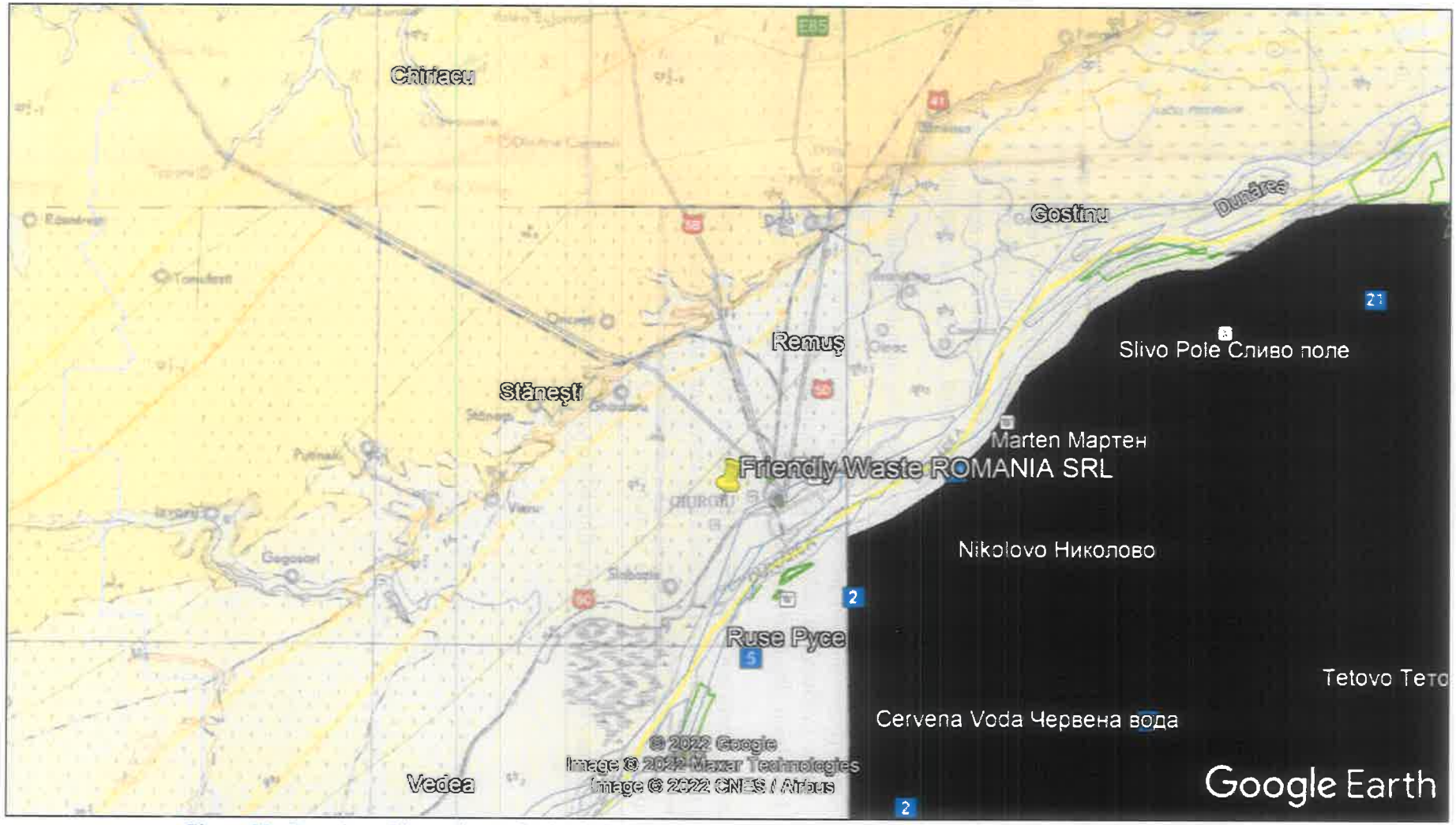


Figure 23 - Location of the project - Geological Map of Romania (Source: geo-spatial.org by accessing Google Earth)

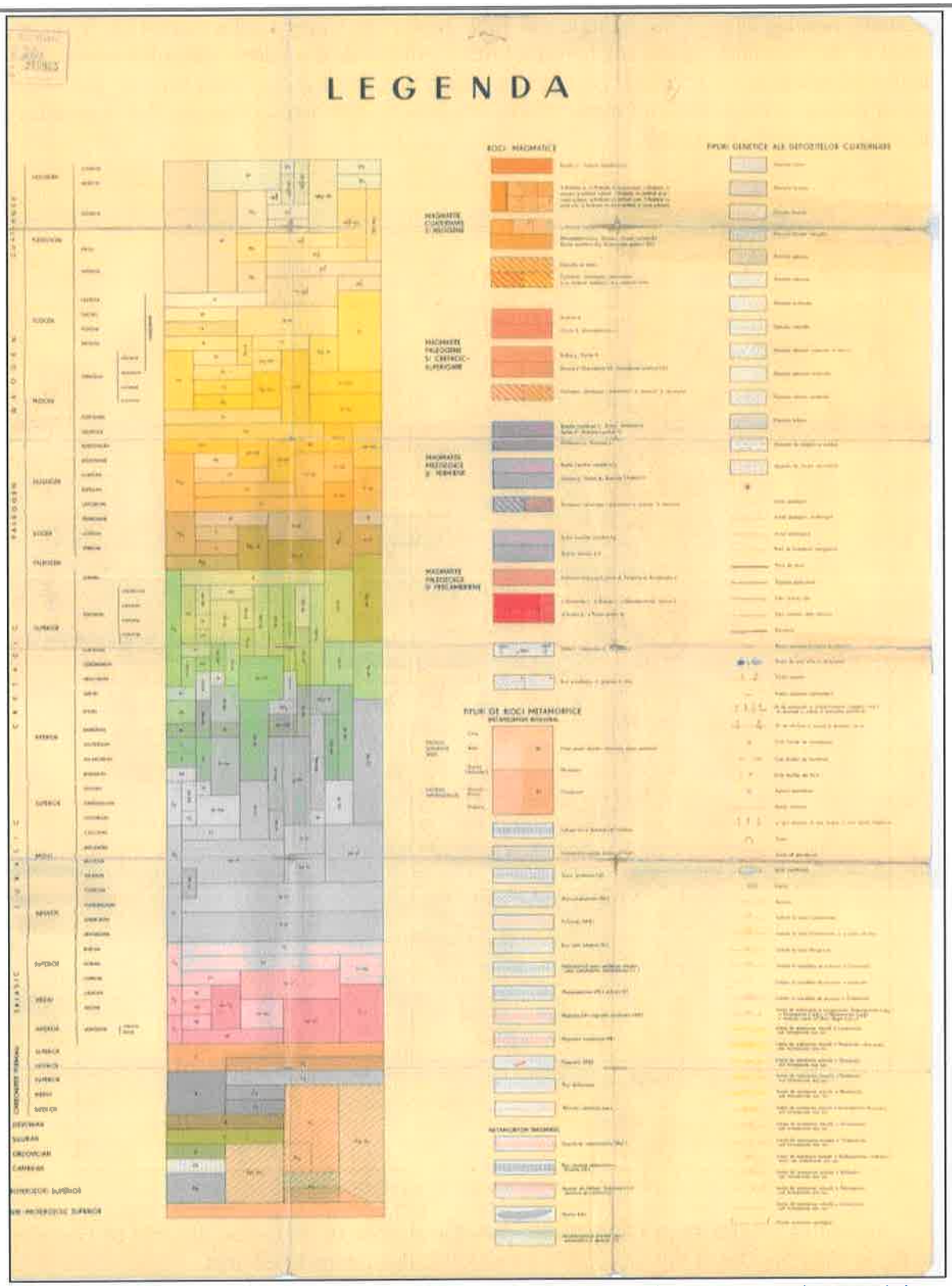


Figure 24 - Legend of the Geological Map of Romania, scale 1:200.000, available on geo-spatial.org website

The studied area is located in Giurgiu county, which is situated in the southern part of the country, in the meadow and on the left bank of the Danube, at an altitude of 23-26 m. Its territory is crossed by the parallel of 45 053" north latitude and the meridian of 25 059" east

longitude, running along 4"43" latitude and 9"21" longitude. Giurgiu is located 64 km from the capital of the country, on the Bucharest - Sofia - Athens or Bucharest - Istanbul route. The Danube connects us to the Black Sea and the North Sea, and the European railway line from Ostend passes through Berlin, Prague, Budapest, Brasov, Bucharest, Giurgiu, Sofia, Istanbul and via Thessaloniki to Athens.

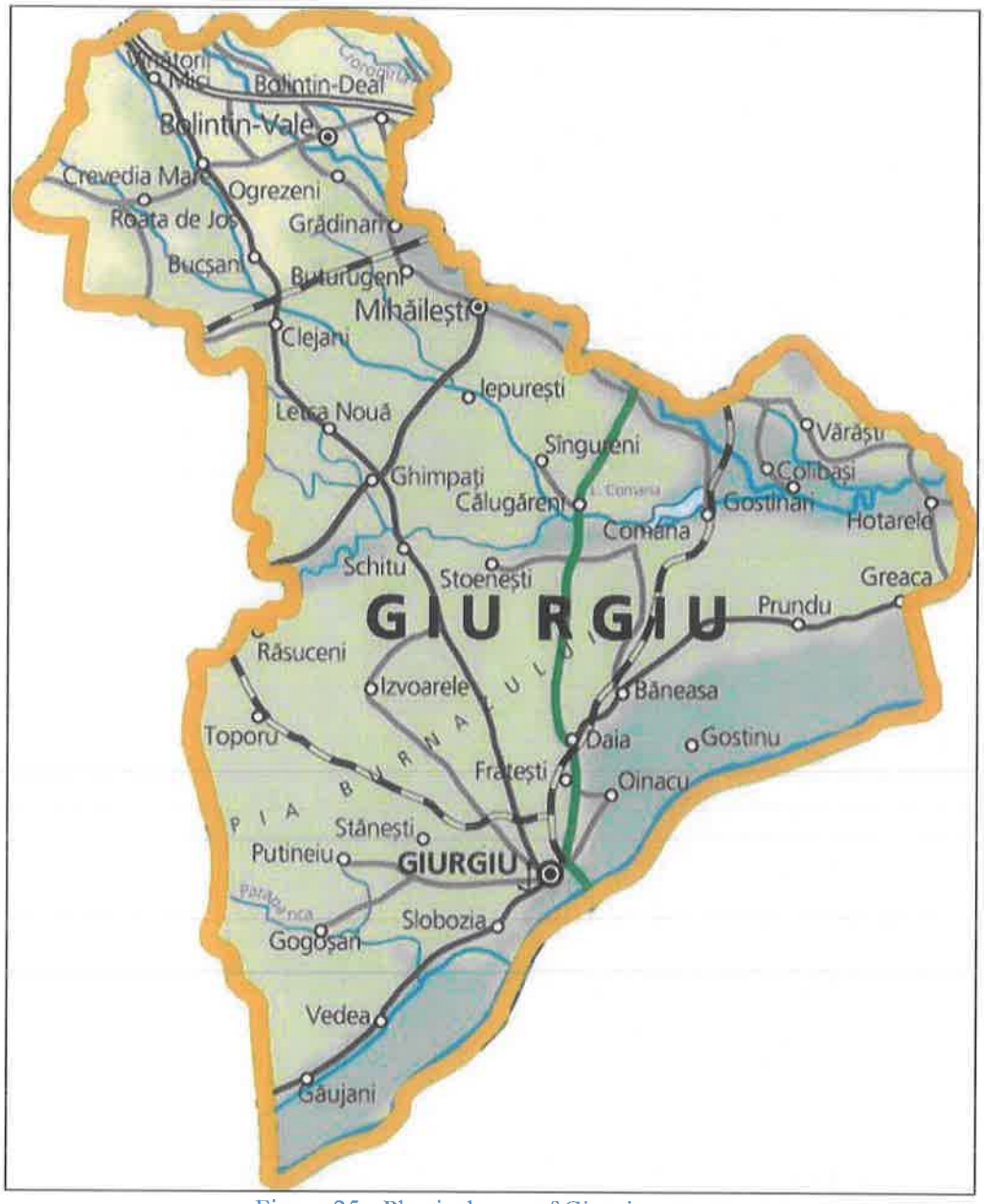


Figure 25 - Physical map of Giurgiu county

According to data from Giurgiu Regional Directorate of Statistics, the area of Giurgiu County is 4862 ha. Out of this area, 2638.14 ha are in the incorporated area.

The territory of Giurgiu represents the youngest geomorphological unit of the relief, largely the result of the action of the Danube (in the Holocene), consisting of meadows, islands, pools and canals (arms). The area between the river and the Burnaz Plain, with widths of more than 10 km, is subdivided into: grind, inner meadow, outer meadow and sometimes meadow

terrace, longitudinally arranged and unevenly developed; near the minor riverbed there is a strip of grinds, with heights of 1-5 m and widths of several tens to several hundreds of meters.

BIODIVERSITY

The project proposed by FRIENDY WASTE ROMANIA SRL does not overlap and is not in the vicinity of protected natural areas of Community interest.

The nearest protected natural areas of Community interest are:

- Special Protection Area for Birds ROSPA0108 Vedea - Danube, being located at a distance of **1,430 m** from the site of the proposed project
- Site of Community Importance ROSCI0088 Gura Vedei - Saica - Slobozia, being located at a distance of **2,870 m** from the site of the proposed project
- Special protection area for birds ROSPA0090 Ostrovu Lung - Gostinu, being located at a distance of **12,110 m** from the site of the proposed project

The location of the project in relation to the three protected natural areas is represented graphically in the following images (Figure 16 and 17):

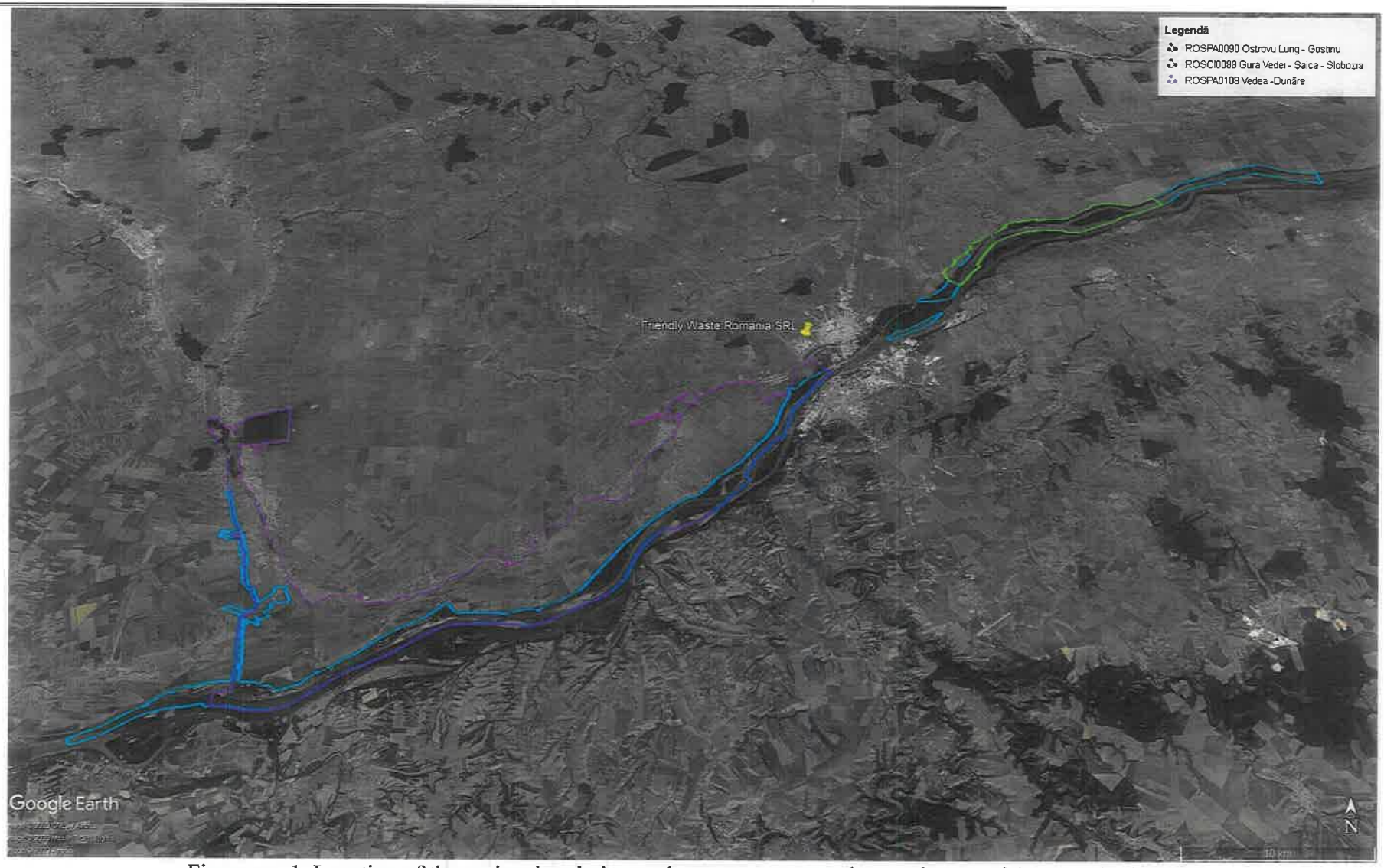


Figure no. 1. Location of the project in relation to the nearest protected natural areas of Community interest

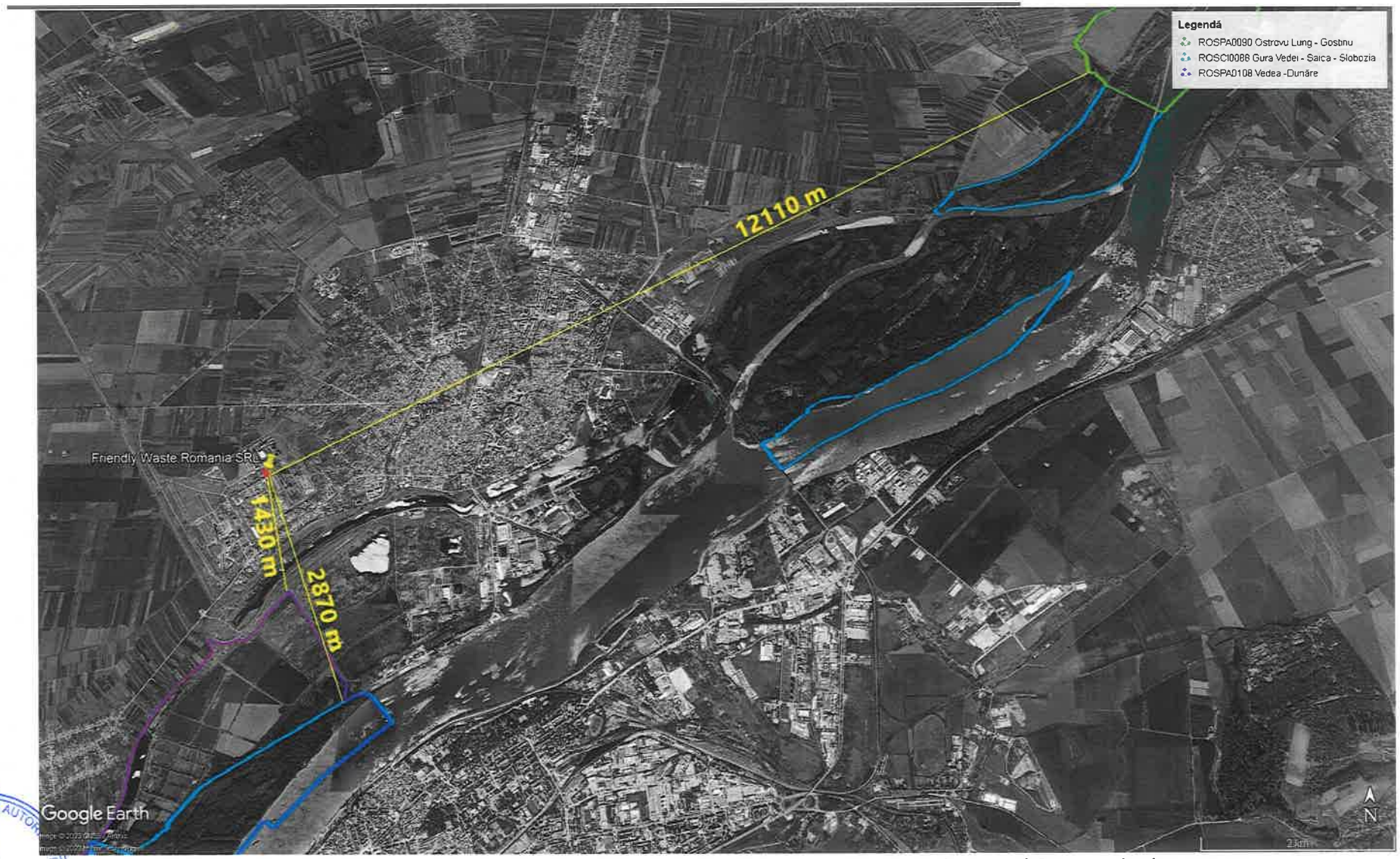


Figure no. 2. Distance between the site of the project and the nearest protected areas of Community interest

Special protection areas for birds aim to conserve, maintain and, where appropriate, restore to a favourable conservation status the bird species and specific habitats designated for the protection of wild migratory bird species of Community interest under the Birds Directive. Their designation in Romania was made by G.D. no. 1284/2007 on the declaration of special protection areas for birds as part of the European ecological network Natura 2000 in Romania.

Sites of Community importance aim to conserve, maintain and, where appropriate, restore to a favourable conservation status the natural habitats and/or populations of the species for which the site has been designated under the Habitats Directive (92/43/EEC).

Considering the very large distances between the site of the project proposed by FRIENDLY WASTE ROMANIA SRL and the protected natural areas of Community interest (ROSCI0088 Gura Vedei - Saica - Slobozia being located at a distance of 2,870 m from the site, respectively ROSPA0090 Ostrovu Lung - Gostinu (being located at a distance of 12,110 m from the site), we consider that the implementation of the project "***Construction of building hall, concrete basin, concrete platforms, fencing, lighting system, execution of drilling and internal network for water supply and sewerage, location of wastewater pretreatment station, location of medical waste incinerator with related facilities***" will not have adverse consequences on the biological diversity characteristic of the two NATURA2000 sites.

Details on biodiversity, from the perspective of the project analyzed in this study, can be found in the attached appropriate assessment study, prepared by Oana SAVIN, a certified lead level expert.

4.2. DATA COLLECTION AND METHODS OF CONDUCTING INVESTIGATIONS

The reference list detailing the sources used for the descriptions and assessments included in this environmental impact report can be found in Chapter 12 of this paper.

The methods used to assess impacts on environmental factors are described in Chapter 6 of the paper.

5. DESCRIPTION OF RELEVANT ENVIRONMENTAL FACTORS LIKELY TO BE AFFECTED BY THE PROJECT

5.1. POPULATION AND HUMAN HEALTH

The notion of human health is considered in the context of other environmental factors and therefore, for the analysis of the effects of the project on the population and human health, the following is considered: health effects caused by the release of toxic substances into the environment, major accident hazards associated with the implementation of the project, effects caused by changes caused by the project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants.

The effects of project implementation on the health of the population are related to implementation, commissioning and operation in relation to the potentially affected population.

Given the specifics of the project, the construction of an incinerator for hazardous and non-hazardous waste, the population and human health are likely to be affected by the project, which is why particular attention will be paid to these issues.

The land proposed for the implementation of the project is located inside the Industrial Platform 2 of the former Giurgiu Chemical Combine. The foundations of the chemical plant buildings are on the site. The entire industrial platform is unhealthy, with foundations and/or buildings in an advanced state of decay, abandoned waste, spontaneous vegetation.

The industrial platform is included in the Local Urban Planning Regulation (RLU) for the General Urban Plan (PUG) of Giurgiu municipality, in subzone I1 - PRODUCTION, STORAGE ZONE where productive industrial and service activities are allowed.

On the eastern side, the industrial platform has a "protection zone" of the$_{LM2}$residential function area, i.e. subzone I3 - SUBZONE OF PRODUCTION AND STORAGE ADJACENT TO ADJACENT PROTECTED FUNCTIONS.

In accordance with the provisions of Art. 11 para. (1) of the Rules of hygiene and public health on the living environment of the population, approved by Order of the Minister health No. 119/2014, as amended, the minimum health protection distance between protected territories and the perimeter of establishments causing discomfort and risks to the health of the population is 500 m in the case of incinerators for hazardous and non-hazardous waste.

The location of the project (perimeter of the unit) in relation to "protected areas" as defined in the normative deed is more than 500 m away, taking into account the following aspects:

The said normative deed defines the terms "protected territory", which includes "living areas", also defined and "perimeter of the unit" as follows:

- ***protected territory*** - territory in which the maximum permissible concentrations of physical, chemical and biological pollutants in environmental factors may not be exceeded; it includes residential areas, parks, nature reserves, areas of balneoclimatic, rest and recreational interest, social-cultural, educational and medical institutions
- ***residential area*** - an area constituted as a functional grouping of territorially delimited lots and parcels of land **on which residential buildings predominate, with average housing density as a parameter of measurement**
- ***perimeter of the unit*** - the boundaries of the land on which an objective is located and on which specific activities are carried out

The site plan below (Figure 26) shows the perimeter of the unit in Stereo 70 coordinates, from which 500 m radius circles have been drawn.

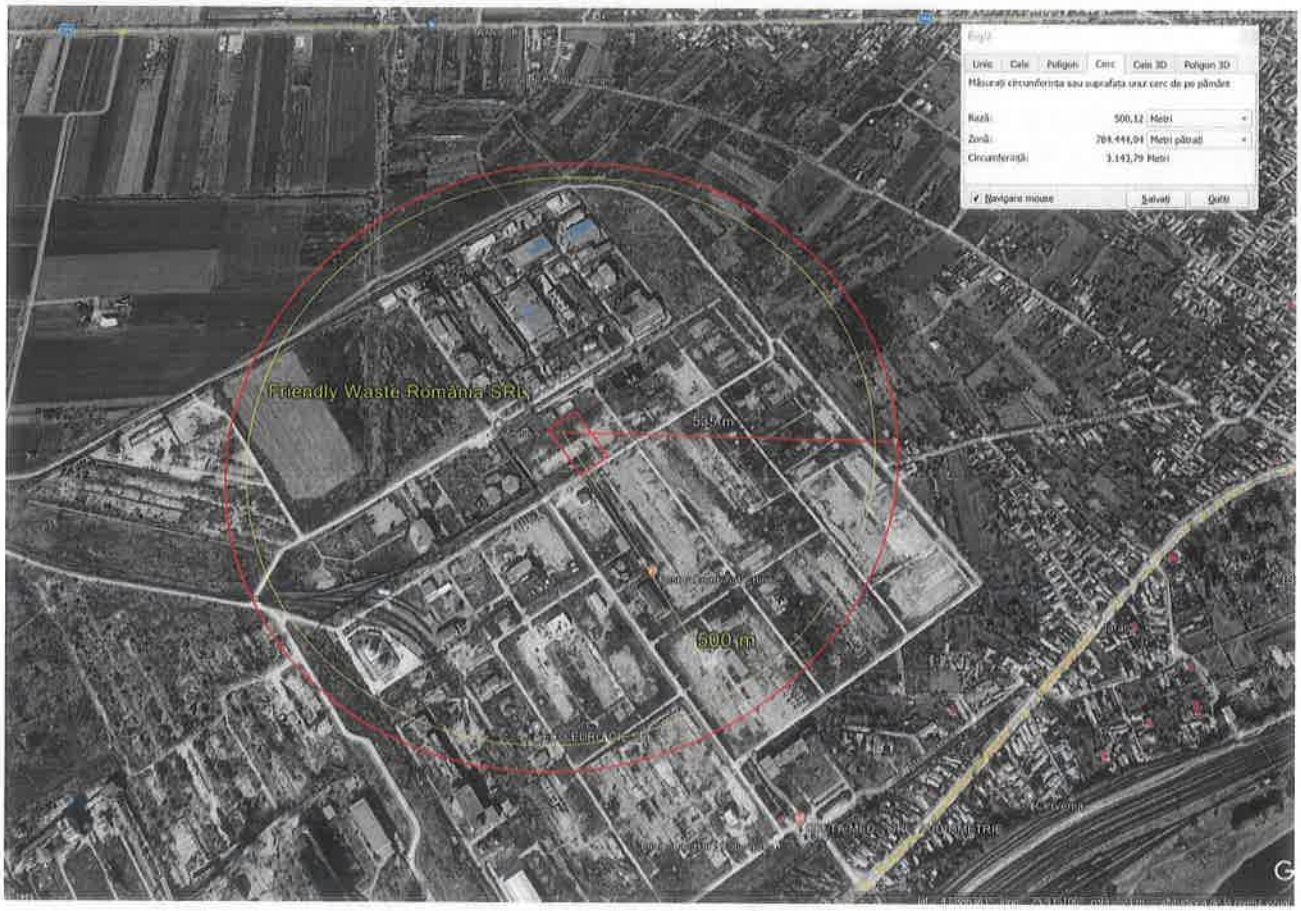


Figure 26 - Location of the project in relation to human settlements (Source: Google Earth)

The distance to the nearest dwelling was stressed (located on str. Drumul Catunului) as 535 m (Figure 27).

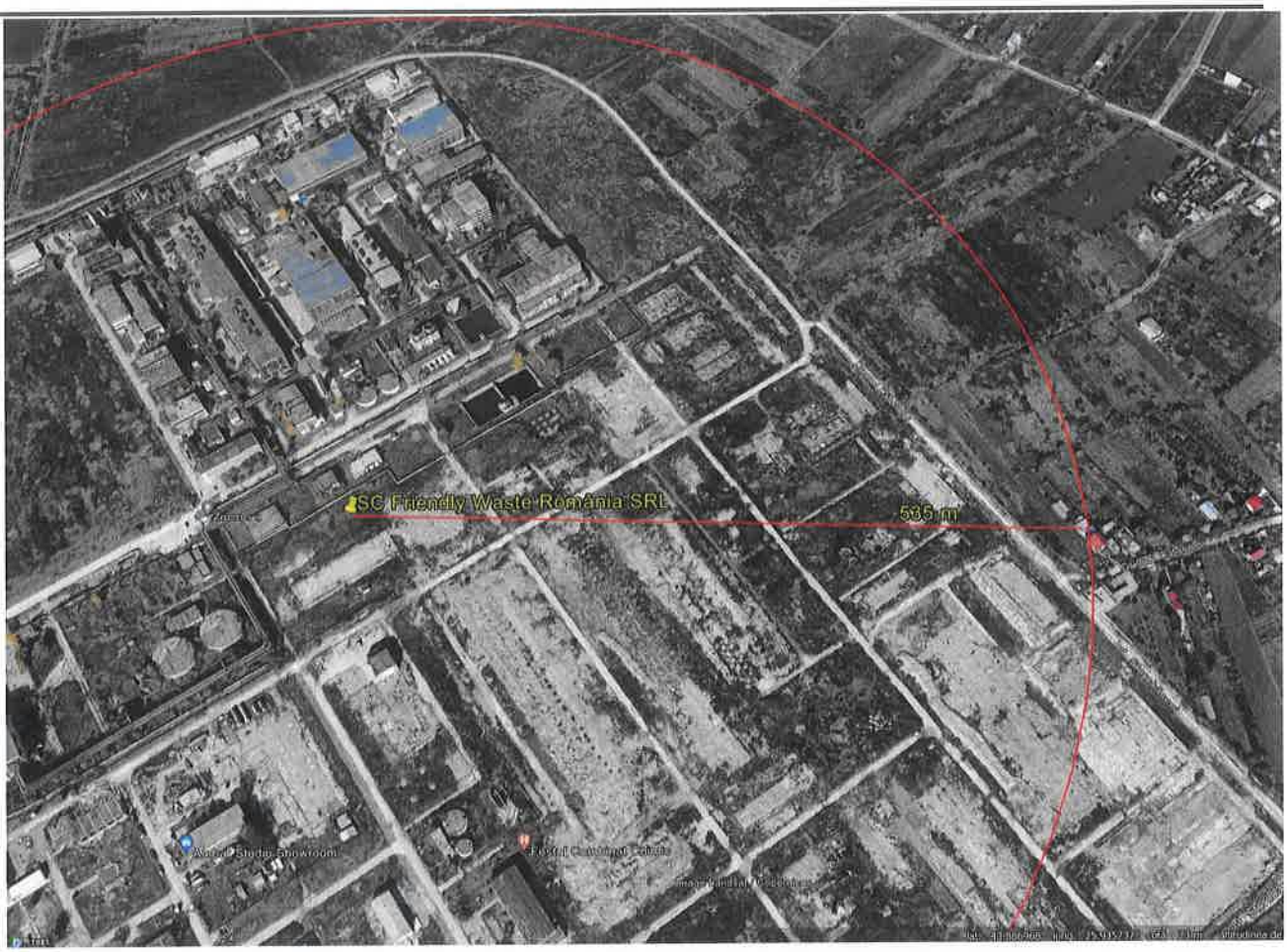


Figure 27 - Housing area located in the south-east in relation to the project site

The dwellings at the end of the str. Drumul Catunului, towards the site under analysis, is not in the "residential area" defined above, given that the "residential area", in the meaning of the normative deed, implies the existence of several lots and parcels delimited territorially on which residential buildings are built and predominate, having as a measurement parameter the average density of housing. In the area where the nearest dwelling to the project site is located, as far as the "living area" (which includes the dwellings from the intersection of the str. Drumul Catunului with str. Cocorului), there are only four dwellings on the lots and plots of land, and vacant land predominates.

Consequently, the area in which the nearest dwelling is located in relation to the site proposed for the implementation of the project does not fall within the legal definition.

The distance between the perimeter of the unit and the living area, within the meaning of the legal provisions, is 570 m.

Also, according to the provisions of Article 43 letter a) - "*Waste incineration plants shall meet the following conditions: a)* ***the location and establishment of the protection area shall be made following environmental and health impact studies***". For this reason, Giurgiu Public Health Directorate has requested the elaboration of a health impact study.

The conclusions of the "Impact assessment study on the health and comfort of the population" prepared by IMPACT SANATATE SRL Iasi for the proposed project are the following: "*Corroborating the previous conclusions, we consider that* ***the activities to be carried out within this investment objective will not negatively affect the comfort and health of the population in the area. We consider that the investment objective can have a positive socio-economic and administrative impact in the area****, and that any negative impact on the health of the population can be avoided by respecting the listed conditions [...]* ***A perimeter fence of trees and shrubs (hedge) will be created around the site****".*

Consequently, the investment that will be implemented will in no way worsen the situation already existing and assumed by the inhabitants in the vicinity of the industrial platform.

Through the measures to protect the environment and the health of the population that will be implemented and that will result in emissions below the emission limit values, odors perceived strictly in the area of the incinerator, perimeter curtain of trees and shrubs around the site, we consider that the investment will not create discomfort for the inhabitants of the str. Drumul Catunului.

The photos below, taken on 20.03.2023, show the current situation of the project site in relation to the nearest houses (in the str. Catunului).

Photo 1 - Photo from the str. Drumul Catunului to the industrial platform

Photo 2 - Photo towards the project site (left) and towards the str. Drumul Catunului (right)

The photos were taken at the intersection of Drumul Catunului and str. Int. Storobaneni, towards the industrial platform (Photo 1 and 2 - left) and towards str. Drumul Catunului (Photo 2 - right), in the location shown in the photo below (Photo 3)

Photo 3 - Photo shooting location

Access to the objective, both during implementation and operation, will be from Slobozia Road, without affecting the population in the eastern part of the site through traffic noise and emissions of particulate matter and exhaust gases.

5.2. BIODIVERSITY

Given the location of the project, within the industrial platform of the former Giurgiu Chemical Combine, we consider that biodiversity is not one of the factors likely to be affected by the project. Giurgiu Environmental Protection Agency considered that *"The project is subject to the provisions of Article 28 of GEO no. 57/2007 on the regime of protected natural areas, conservation of natural habitats, wild flora and fauna, with further amendments and completions and according to the point of view no. 130/ST GR/12.05.2021* (which was not forwarded to the project holder), *of the custodian of Natura 2000 site ROSPA0108 Vedea - Danube (in the vicinity of which the investment will be carried out) - ANANP ST Giurgiu, the project is likely to have a negative impact on the conservation status of the species for which the area of Community interest has been declared"* and requested the preparation of the appropriate assessment study.

The assessment of impacts on biodiversity has been analyzed in the Appropriate Assessment Study prepared by Oana SAVIN - Senior Expert for the preparation of Appropriate Assessment Studies (EA) and is attached to this paper.

The appropriate assessment was carried out in coordination with the environmental impact assessment in accordance with the procedures specified in the Guidelines of the European Commission on Streamlining Environmental Assessments pursuant to Art. 2 (3) of the EIM Directive.

5.3. LANDS AND SOIL

Land occupation:

According to the Town Planning Certificate no. 123/07.03.2023 issued by Giurgiu Municipality, the land occupation percentage (POT) is a maximum of 60% and the land use coefficient (LUC) is a maximum of 2.4 sqm ADC/sqm land or, as the case may be, 12 m^3/sqm land.

All related parking will be provided on the plot, outside the space for public or private roads and will be sized in accordance with the parking regulations in force, so that road traffic on Sos. Slobozia or on the surrounding roads is not disturbed.

Possible sources of soil pollution are possible accidental spills of fuels or lubricants from vehicles and machinery servicing the construction activity and then the specific activities during the incinerator operation phase

Measures, facilities and arrangements for soil and subsoil protection

The following measures have been foreseen to avoid soil pollution:

- the functionality of the thermal engines of the vehicles used for construction work shall be checked in due time
- no fuel and oil depots are set up in places other than those equipped in accordance with legal requirements;
- maintenance and repair works on machinery and means of transport shall be carried out only in specially designated places;
- no washing of machinery and vehicles shall be carried out on the premises, with the exception of washing for the sanitation of means of transport of non-hazardous animal waste;
- the supply of diesel and lubricants to machinery is carried out under all conditions to avoid accidental losses and to protect the environment in specially equipped places - fuel distribution stations;
- all machinery and vehicles used in the construction work and then in the incineration work run on designated roads and are parked only on concrete platforms
- waste for incineration shall be temporarily stored only in special containers in specially designated areas
- the waste from the incineration process is collected in special containers in an appropriate area.

As the entire activity will be carried out on concrete platforms, the impact on soil generated by the implementation of the project is neutral/negligible, insignificant.

Given the area where the project is implemented, the industrial platform of a former chemical plant, the works foreseen in the project do not affect organic matter or other soil degradation phenomena, i.e. erosion, subsidence and waterproofing.

Soil is not an environmental factor likely to be significantly affected by the project.

5.4. WATER

The construction work as well as the incinerator installation work will result only in domestic wastewater from the sanitary facilities. These will be of the eco-toilet type and will be collected and disposed of by the company that will be renting these eco-toilets.

The operation of the incinerator results in industrial wastewater from the washing of containers for the transport of non-hazardous animal waste, from the washing of concrete platforms and bins used for the transport of waste, as well as domestic wastewater. This water will be collected via the on-site sewage system in the 10 cubic meter drainage basin, from where it will be taken to the pre-treatment station and from there to the sewage network in the area.

The quality indicators for treated wastewater discharged to the sewerage system shall be in accordance with NTPA 001.

Causes that may lead to potential pollution of surface water as well as groundwater, through infiltration of pollutants into the groundwater, during the implementation of the project activity as well as during the operational phase may be related to:

- accidents in the normal operation of machinery used in construction work (crane, fork-lift truck) leading to possible accidental loss of lubricants and/or fuels
- possible accidental damage to the diesel tanks of the vehicles serving the activity
- possible accidental loss of lubricants by machinery or vehicles servicing the activity

Even in the unlikely event of the accidental situations described above, given that all activity on the site takes place only on concrete pads and there are no surface waters nearby, the impact on surface or groundwater is insignificant.

The nearest surface water is the Plant Canal, about 1000 m away.

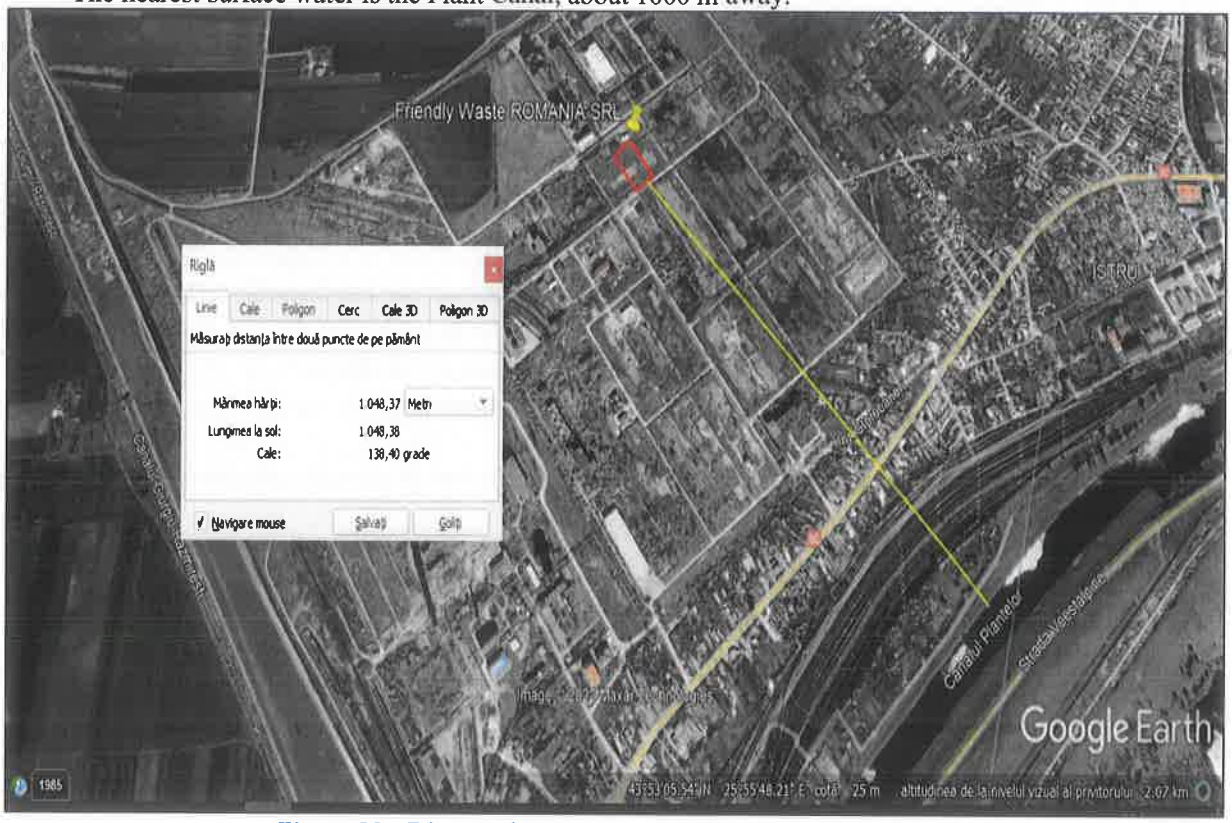


Figure 28 - Distance between target and nearest surface water

The operation of the dry absorbing system does not result in waste water, as it is a dry system.

5.5. AIR AND CLIMATE

Sources and pollutants generated during the achievement of the objective

At this stage there will only be mobile sources of pollution, not stationary sources.

The sources of air pollution during the incinerator and mobile construction works are the machinery and means of transport carrying out the works:

- transport of components of mobile buildings
- transport of incinerator components
- loading - unloading of the components of the mobile buildings and the incinerator
- construction of anchoring foundations (blocks of sleeves)
- incinerator assembly
- assembly of mobile constructions

The machinery and means of transport to be used are:

- crane
- heavy goods vehicles
- heavy goods vehicles

All of them are equipped with diesel engines. The characteristic pollutants are:

- sulphur dioxide:
- carbon monoxide
- nitrogen oxides
- persistent organic pollutants (POPs)
- heavy metal compounds (especially cadmium) in exhaust gases

Concentrations and mass flows of discharged pollutants

The type and volumes of works to be carried out during the whole period of the incinerator and mobile construction are:

- crane handling of mobile construction components and incinerator components (approx. 40 hours crane operation)
- transport of materials for the construction of anchoring foundations and transport of mobile construction components and incinerator components. Approx. 300 t of materials with a number of approx. 30 trips

The mass flows of pollutants to be discharged with the exhaust gases by the machinery and means of transport used were calculated according to the Methodology for calculating the contributions and taxes due to the Environment Fund, approved by Minister Order no. 578/2006, depending on:

- type and capacity of the machine
- the type of fuel used and its sulphur content
- fuel consumption per machine/vehicle
- working regime
- operating conditions

The fuel used shall be diesel fuel with a maximum sulphur content of 0,2%

The calculation formula is:

$E_i = FE_i \times N_i \times CC_i$

where: E_i = pollutant mass flow rate

FE_i = emission factor corresponding to the pollutant and the category of the machine/vehicle

N_i = number of vehicles in the relevant category

CC_i = specific diesel consumption for the machine/vehicle category (this must be converted into kg depending on the density of the fuel used - for diesel d = 820 -845 kg/m3 (density at 15 degrees C.)

SO_2 emission calculation:

$ESO_2 = K_S \times C$ (kg)

Where:

E SO_2 - SO_2 emission

Ks - S content of fuel, expressed in relative mass (kg/kg); for diesel used $K_S = 0{,}002$

C - fuel consumption (kg)

Emission factors for heavy-duty diesel vehicles (> 3,5 t) - diesel fuel

Table 14 - Diesel emission factors

	NO_x	CH_4	VOC	CO	N_2O	CO_2
Moderate control, fuel consumption of 30.8 l/100 km						
total g/km	10.9	0.06	2.08	8.71	0.03	800
g/kg fuel	42.7	0.25	8.16	,34,	0.12	3138
g/MJ	1.01	0.00	019	0.80	0.003	73.9

For all the activities to be carried out, diesel consumption is estimated at approx. 700 l, a total number of operating hours of machinery and vehicles of approx. 50, an average hourly consumption of 15.4 l/h/vehicle and a number of 4 such machines (1 crane and 3 means of transport). In this case, we will have:

A. Hourly average mass flow rates of pollutants from all sources assuming simultaneous operation:

Average hourly consumption = 4 machines x 15.4 l/h/machine = 91.6 l/h = 76.03 kg/h (d = 0.830 kg/l)

Table 15 - Pollutant mass flow rates (g/h)

	Mass flow (g/h)						
	NO_x	CH_4	VOC	CO	N_2O	CO_2	SO_2
FE g/kg fuel	42.7	0.25	8.16	34.2	0.12	3138	2
total emissions all sources	3246	19	620	2600	9	238583	152.06

It has been taken into account that not all machinery and vehicles involved in the construction and transport of materials and components are in operation at the same time.

B. Total emissions for the entire incinerator and metal hall siting activity:

Estimated total diesel consumption = 700 l = 581 kg (d = 0.830 kg/l).

Table 16 - Pollutant mass flow rates (kg)

	Mass flow (kg)						
	NO_x	CH_4	VOC	CO	N_2O	CO_2	SO_2
FE g/kg fuel	42.7	0.25	8.16	34.2	0.12	3138	2
total emissions all sources	24.80	0.14	4.74	19.87	0.07	1823.18	1.162

Bearing in mind the following:

- in reality the mass flow rates of these pollutants are much lower because the machines will never work all at the same time
- pollutants released in exhaust fumes are released freely into the atmosphere

- dispersion conditions at the site under consideration are very good
- the quantities of dust released during the works and transport are very low, as the site will be worked on only concrete platforms and vehicles will be driven only on asphalt or concrete roads

it is estimated that the pollution generated for the environmental factor air at this stage will be insignificant and will not cause discomfort

Sources and pollutants generated during operation of the target

Activities that will generate sources of air pollution are those related to:

- combustion of fuel (LPG) in the incinerator
- on-site traffic (vehicles entering and leaving the site carrying waste for disposal on site, removal of ash and waste from the site, internal transport)

The characteristic pollutants are:

- sulphur dioxide:
- carbon monoxide
- nitrogen oxides
- persistent organic pollutants (POPs)
- heavy metal compounds (especially cadmium) in exhaust gases

Facilities for the containment, discharge and dispersion of pollutants in the environment

For mobile sources - all vehicles and machinery that will be used, both during the project implementation phase and during operation, will be equipped with low emission engines, according to national standards harmonized with European standards, starting from EURO 5.

For stationary sources - the incinerator to be installed and commissioned:

The IE 1000R-300 incinerator is equipped with:

- secondary combustion chamber with features:
  - V = 9.7 m3 equipped with 1 burner to burn the flue gases from the primary chamber
  - secondary combustion chamber temperature - 1100°C
  - gas retention time in the secondary combustion chamber - 2 seconds
- dry absorbing flue gas cleaning/washing system comprising:
  - flue gas cooling system;
  - dry absorbing system for flue gas cleaning;
  - dry particle filtration system;
  - exhaust fan for exhausting combustion gases;
  - flue gas chimney and chimney connector with features:
    - height H = 10 m
    - diameter Ø =0.5 m
    - the outlet area S = 0.196 m^2

In the event of a breakdown leading to an emergency shutdown of the incinerator (which is highly unlikely) the operating protocol will include the following phases:

1. when the incinerator stops suddenly (due to a malfunction) the LPG supply to the burners will automatically stop (process coordinated and controlled by the process computer-aided automation system). In this case the combustion process will also be stopped, which will stop the flue gas generation process
2. allow the 2 combustion chambers to cool down
3. all the flue gases that will still be released before the combustion chambers cool down will pass through the gas scrubber and filter system and then be discharged into the atmosphere

through the incinerator stack. The quantities of such gases will be very small and without impact on the environmental factor air

4. the cause of the stoppage is determined, the fault is identified and the technical measures to remedy the fault are determined. The combustion chambers (primary and/or secondary) will only be opened if absolutely necessary. Taking into account the construction and operating principle of the incinerator, it is unlikely that a malfunction will occur inside one of the two combustion chambers leading to a sudden shutdown of the incinerator,
5. After the fault has been rectified, the condition of the system and of the entire incinerator is checked by computer diagnosis, after which the incinerator is restarted in accordance with the start-up procedure in the technical book.

For situations where incinerator malfunctions occur, they will be reported in advance by the automated monitoring system, in which case the procedural steps below apply:

1. the supply of waste to the primary chamber is stopped (continuous supply system)
2. the incineration process is completed for the entire quantity of waste in the primary combustion chamber
3. the LPG supply to the combustion system in the 2 chambers of the incinerator is switched off.
4. 2 chambers of the incinerator are allowed to cool.
5. The fault will be identified and the technical repair solution and working procedure will be established.
6. Malfunction is rectified.
7. The incinerator is restarted following the start-up procedure in the technical book.

In this situation, no pollutants are emitted into the atmosphere at levels above those typical of normal operation.

In the event of a fault in the electricity supply to the site, the following procedural steps are taken:

- automatically starts the electric generator.
- The supply of waste to the primary combustion chamber is stopped.
- the incineration of existing waste in the primary chamber will be completed
- the procedure for shutting down the incinerator is initiated
- the power grid is expected to come back on
- check the technical condition of the incinerator and restart it following the procedural steps in the technical book.

The running time of the generator will be limited by the time of completion of the incineration of the waste in the primary chamber at that time (with the waste supply switched off) after which it will stop waiting for the power supply to return from the grid. As such the amount of exhaust gas generated will be reduced. Combining this with the minimum EURO 5 pollution level of the thermal engine with which the generating set will be equipped, the quantities of pollutants emitted into the atmosphere during the operating time of the generating set will be very low and without significant negative impact on the environmental factor air.

Characterization of sources of air pollutants related to the objective

a) The incinerator to be located on the site

The IE 1000R-300 incinerator is to be installed on the site under consideration.

It runs on LPG and will have an hourly consumption of approx. 122 l/h resulting in a flue gas volume of 583.4 m^3/h plus the air introduced by the forced draught system, resulting in a flue gas volume of 5000 m^3/h

The source falls into the category of sources with controlled pollutant control facilities (emission containment). In this respect the incinerator is equipped with a dry absorbing system.

For the determination of the exhaust gas flows to the incinerator stack the calculation is exemplified below:

Stoichiometric conditions in the combustion process refer to the quantitative ratios between the fuel constituents and air.

Under laboratory conditions, with accurate and controlled measurements, one can speak of stoichiometric conditions, with an exact calculation of masses in the ratio of elements. Under normal operating conditions, this is impossible.

The energy source in any fuel is carbon. In fuels there are also the other elements that influence combustion, namely N, S, H_2O.

For different types of fuel there is a ratio between the amount of atmospheric air (20% O_2) consumed to burn one kg of fuel.

The ratio for LPG is 1 l LPG requires 25 l air.

The calorific value for one liter of LPG is 11070 kcal/kg

1 kg LPG = 1.727 liters

1 kg air = 0.77 m^3

One kg of LPG requires 14.475 Nm^3 of air and one litre of LPG approximately 0.025 Nm^3 of air.

These are theoretical stoichiometric conditions.

In practice the conversion phenomenon is not 100% efficient, so burner manufacturers offer the possibility of adding excess air. In most cases it is up to 100%.

Taking all these data into account, the flue gas flow rates (where the additional air supply providing the oxygen needed for combustion is also taken into account) can be calculated for the incinerator analyzed above (all calculations are expressed under normal pressure and temperature conditions - 273.15 oK, 101.325 kPa):

- IER incinerator - 1000-300

122.5 x 25 x 0.77 + 100% = 4716.25 Nm^3/h

The literature says that an incinerator should ensure min. 6% excess oxygen.

It follows from the above that for every Kilocalorie we have to provide

- 9.542/8520 = 0.0011971 m^3 of air.

The incinerator is equipped to provide additional air for combustion, depending on the capacity of the primary combustion chamber. Therefore, we have the following situations:

- the IE 1000R-300 incinerator is equipped with an additional air injection system (turbine) whose operation is controlled by the automated and computerized temperature and combustion control system;
- at the same time, the injectors are also equipped with turbo blowers that ensure an increased air flow necessary for complete combustion, which are also controlled automatically. This system provides between 2000 and 3000 $Nm^3/h$of air. In this case the average hourly discharge will be 5000 Nm^3/h.

b) <u>Traffic on the premises</u>

It is represented by:

- entry and exit of vehicles transporting waste for disposal by incineration
- entry and exit of vehicles transporting waste water from the sewage ponds to the Giurgiu waste water treatment plant
- entry and exit of vehicles transporting waste generated on the site
- internal waste handling activity

Transport of non-hazardous and medical waste is achieved with the company own trucks (4 trucks to be authorized).

Taking into account the activity of the company, it is estimated that 1 trip/day with 4 trucks, respectively 4 trips/day will be made.

The specific diesel consumption of the vans used for transport is on average 17 l per 100 km.

The forklift works on average 4 hours/day, with a random schedule depending on the daily activity and has a consumption of 6 l/h.

The mass flows of pollutants discharged into the atmosphere with exhaust gases from means of transport and machinery used in the traffic of the premises were calculated according to the Methodology for calculating the contribution and taxes due to the Environmental Fund, approved by OM no. 578/2006 with further amendments and completions.

The pollutants emitted consist of particulates, sulphur dioxide, carbon monoxide, nitrogen oxides, persistent organic pollutants (POPs), heavy metal compounds (mainly cadmium). These pollutants were calculated using the same formulae as for the calculation of pollutant emissions from machinery and means of transport used in the implementation phase of the project.

Taking into account the schedule of the activity, the average hourly mass flows of the resulting pollutants were calculated. The values are given in the table below:

Table 17 - Pollutant mass flow rates

	Average mass flow (g/h)				
	NO_x	SO_2	PM	POP	Cd
All sources	118.3	2.07	19.6	0.0098	0.000028

The sources are undirected, i.e. the polluted air is not taken in and exhausted through an exhaust system. In this case the pollutant concentrations at emission cannot be calculated. The pollutants released in exhaust fumes are released freely into the atmosphere The dispersion conditions at the site under consideration are very good.

Analyzing the mass flow rates of pollutants discharged into the atmosphere, it can be concluded that this source of pollution is insignificant, even more so if compared with the quantities of pollutants emitted on the traffic arteries (in this case on the DN4, which is located at a certain proximity to the objective analyzed.

Concentrations and mass flow rates of pollutants discharged into the atmosphere

- *For stationary directed sources*

According to the specifications in the technical books of incinerators equipped with LPG burners, compared with the average values according to European standards, for pollutants emitted into the atmosphere we have the values:

Table 18 - Average Emissions and EU Standards of Base Incinerators (with secondary compartment)

Parameter	Standard values	Measured values at incinerators
Solid particles	30 mg/m³	1.2 mg/m³
Sulfur dioxide	200 mg/m³	2.4 mg/m³
Nitrogen Dioxide*	400 mg/m³	60 mg/m³
Carbon monoxide	100 mg/m³	78.3 mg/m³

Normally at incinerators equipped with:

- secondary combustion chamber for the flue gases from the primary chamber
- "dry absorbing system" gas cleaning system
- bag filtration system

stack emission values for these parameters are much lower.

For these reasons, the mathematical modelling of the dispersion of pollutants into the atmosphere resulting from the operation of the incinerator at full capacity will be achieved with the values in the technical book (those in Table 15).

Combustion of fuel (LPG) in the incinerator

Centralized data for pollutants emitted from stationary sources are given in the tables below for an hourly consumption of 122.5 l/incinerator = 122.5 l LPG/h:

Table 19 - LPG emission factors

pollutant emitted	NO_x	PM_{10}	CO
FE mg/m3 gas	0.001504	0.0001216	0.00064
FE mg/kg LPG	0.00036	0.000029	0.00015
FE mg/l LPG	0.00065	0.000053	0.00028

Table 20 - Emissions from stationary sources of controlled pollution

Source name	Pollutant	Mass flow (mg/h)	Poluted gas/air flow rate (m^3/h)	Emission concentration (mg/m^3)[12]	Alert threshold (mg/m^3)	VLA[13] (mg/m^3)
Flue gas exhaust stack incinerator	NO_x	0, 08	5000	0.00005	245	350
	SO_2	-		-	24.5	35
	CO	0.006		0.000004	70	100
	PM_{10}	0.034		0.00002	3.5	5
	VOC	-			n.n.	n.n.

Burning of fuel (LPG) and waste in the incinerator

For burning waste in the incinerator, the required hourly fuel consumption was set at 122.5 l LPG/h for an incinerated waste quantity of 300 kg/h.

The emission values given in the technical book for the analyzed incinerator are those in Table 15, respectively:

- Solid object particles = 1.2 mg/m³

[12] the worst-case situation is considered when no additional air is added (by forced injection) to the fuel combustion process

[13] Reference conditions T = 273 °K, P = 101.3 kPa, dry gas, oxygen content 11%

- Sulphur dioxide = 2.4 mg/m³
- Nitrogen dioxide = 60 mg/m³
- Carbon monoxide = 78.3 mg/m³
- HCl = 5.38 mg/m³
- HF = 0.04 mg/m³
- COT = 4.6 mg/m³

These values are valid for an air flow required to burn the fuel used in the incinerator, respectively: 122.5 x 25 x 0.77 = 2415.88 m³

Taking into account that the IE 1000R-300 incinerator is equipped with an additional injection system (turbine) whose operation is controlled by an automated and computerized temperature and combustion control system and that the injectors are also equipped with turbo blowers which ensure an increased air flow necessary for a complete combustion which is also controlled automatically, a surplus of air between 2000 and 3000 Nm³/h is ensured. In this case the average hourly flue gas flow rate will be 5000 Nm³/h in which case the concentrations of the pollutants in the emission resulting from waste incineration will be corrected by a coefficient of 0.48 (2415.88 m³): 5000 m³ = 0.48).

Consequently the concentrations of these pollutants at the outlet of the incinerator stack will be:

- solid particles = 1.2 x 0.48 = 0.579 mg/m³
- sulphur dioxide = 2.4 x 0.48 = 1.152 mg/m³
- nitrogen dioxide = 60 x 0.48 = 28.8 mg/m³
- carbon monoxide = 78.3 x 0.48 = 37.584 mg/m³
- HCl = 5.38 x 0.48 = 2.58 mg/m³
- HF = 0.04 x 0.48 = 0.019 mg/m³
- COT = 4.6 x 0.48 = 2.208 mg/m³

Table 21 - Mass flow rates and concentrations of pollutants emitted to the atmosphere during operation under load without additional air supply

Source name	Pollutant	Mass flow (g/h)	Poluuted gas/air flow rate (m³/h)	Emission concentration (mg/m³)[14]	VLE[15] (mg/m³)	Outlet point
LPG combustion + waste	NO_x	144	2416	60	200	Flue gas exhaust stack incinerator
	SO_2	5.75		2.4	50	
	CO	187.9		78.3	-	
	TSP	2.9		1.2	5	
	VOC	0		0	n.n.	
	HCl	13		5.38	10	
	HF	0.097		0.04	1	
	COT	11.11		4.6	10	
	PCDD and PCDF	101.47[16]		0.042[17]	0.1[18]	

[14] the worst-case situation is considered when no additional air is added (by forced injection) to the fuel combustion process
[15] Daily average limit values cf Annex 6, L 278/2013, reference conditions T = 273 °K, P = 101,3 kPa, dry gas, oxygen content 11 %
[16] expressed in ng I.TEQ/Nmc
[17] ibid.
[18] ibid.

Table 22 - Mass flow rates and concentrations of pollutants emitted to the atmosphere during load operation with supplementary air supply

Source name	Pollutant	Mass flow (g/h)	Poluuted gas/air flow rate (m^3/h)	Emission concentration (mg/m^3)[19]	VLE[20] (mg/m^3)	Outlet point
LPG combustion + waste	NO_x	144	5000	28.8	200	Flue gas exhaust stack incinerator
	SO_2	5.75		1.15	50	
	CO	187.9		37.58	-	
	PST	2.9		0.58	5	
	VOC	0		0	n.n.	
	HCl	13		2.6	10	
	HF	0.097		0.019	1	
	COT	11.11		2.22	10	
	PCDD and PCDF	101.47[21]		0.0035[22]	-	

Normally the incinerator will only operate with additional air supply because in the event of a fault in this process the automation system will initiate the incinerator shutdown sequence. It consists of:

1. stopping the supply of waste to the primary chamber
2. combustion control in primary chamber injectors with injector air supply
3. operation of the incinerator until all waste in the primary combustion chamber has been incinerated
4. stopping the supply of injectors
5. cooling of incinerator chambers
6. troubleshooting
7. restarting the incinerator

The additional air supply does not affect the amount of pollutant emitted into the atmosphere per unit time but only its concentration at the incinerator stack outlet. This will not affect the calculated values of pollutant concentrations in the emission determined by mathematical modelling, since the modelling is achieved as a function of the quantities of pollutants emitted per unit time, regardless of their concentration in the emission.

[19] the situation when additional air is added (by forced injection) to the fuel combustion process is considered
[20] Daily average limit values cf Annex 6, L 278/2013, reference conditions T = 273 ^{oK}, P = 101,3 kPa, dry gas, oxygen content 11 %
[21] expressed in ng I.TEQ/Nmc
[22] ibid.

Table 23 - Pollutants emitted into the atmosphere from incinerator operation

Name of activity	Sources of air pollutants					Physical characteristics of sources			Exhaust gas parameters		
	Name	Consumption GPL l/h	Annual working time hours[23]	Pollutants generated	Quantities of pollutants generated kg/year[24]	Name	Height m	Inside diameter (area) at the top of the stack m^2	Speed m/s	temperature °C	Volume flow m^3/s mass flow mg/s
Waste incineration	Incinerator IE 1000R-300	122.5	**10 h/day x 320 days/year = 3200 h/year**	NO_x	0.614	Flue gas exhaust chimney	10	0.5 m 0.196	7.09	1900	• 1.38 • 0.00002
				SO_2	-						• -
				CO	0.046						• 1.38 • 0.0000017
				PM_{10}	0.261						• 1.38 • 0.000009
				VOC	-						• -

[23] normally in the incinerator, combustion is initiated when the waste is fed into the incinerator and then the combustion is maintained by the heat input (self-sustaining combustion) from the incinerated waste. For this reason, it was calculated that the LPG supply to the burners for the operation of the incinerator is on average 10 hours/day

[24] the calculation is made for 24 h/day operation (worst case where we have maximum emissions to air), without taking into account the phenomenon of self-combustion of waste

Table 24 - pollutants emitted into the atmosphere from the operation of the incinerator with a waste burning rate of 300 kg/h

Name of activity	**Sources of air pollutants**						**Physical characteristics of sources**			**Exhaust gas parameters**		
	Source name	Amount of waste incinerated kg/h	Consumption GPL l/h	Annual working time hours[25]	Pollutants generated	Quantities of pollutants generated kg/year[26]	Name of outlet point	Height m	Inside diameter and area at the top of the stack m/m^2	Speed m/s	temperature °C	Volume flow m^3/s mass flow mg/s
Waste incineration	Incinerator IE 1000R-300	300	122.5	**LPG: 10 h/day x 320 days/year = 3200 h/year waste: 24 x 320 = 7680 h/year**	NO_x	1105.92	Flue gas exhaust chimney	10	0.5 m 0.785 m^2	1.769	190	• 1.38 • 40
					SO_2	44.16						• 1.38 • 1.6
					CO	1443.07						• 1.38 • 52.19
					PST	22.27						• 1.38 • 0.8
					VOC	-						• 1.38
					HCl	99.58						• 1.38 • 3.61
					HF	0.74						• 1.38 • 0.0269
					COT	85.10						• 1.38 • 3.086
					PCDD and PCDF	0.000768						• 1.38 • 0.0000278

[25] normally in the incinerator, combustion is initiated when the waste is fed into the incinerator and then the combustion is maintained by the heat input (self-sustaining combustion) from the incinerated waste. For this reason, it was calculated that the LPG supply to the burners for the operation of the incinerator is on average 10 hours/day

[26] the calculation is made for 24 h/day operation (worst case where we have maximum emissions to air), without taking into account the phenomenon of self-combustion of waste

For mobile sources

The unit under analysis will use 4 diesel-powered trucks with a capacity of less than 3.5 t, with an average consumption of 11.5/100 km or 8 l/hour.

According to the specific activities to be carried out on the site under consideration, the most demanding situation concerning the simultaneous operation of the engines of the trucks and the forklift truck involves:

- a maximum of 2 trucks present on the site with engines running simultaneously
- their simultaneous operation for a maximum of 2 hours/day
- a maximum hourly consumption (combustion in the thermal engines of the trucks) of diesel fuel per site of 16 l
- operation of the forklift truck for a maximum of 1 hour overlapping with the operation of the truck engines, at an hourly consumption of 6 l diesel fuel
- a maximum hourly consumption (combustion in the thermal engines of the trucks + forklift engine) of diesel fuel per site of 16 + 6 = 22 l/h

The mass flows of pollutants to be discharged with the exhaust gases by the machinery and means of transport used were calculated according to the Methodology for calculating the contributions and taxes due to the Environment Fund, approved by Minister Order no. 578/2006, depending on:

- type and capacity of the machine
- the type of fuel used and its sulphur content
- fuel consumption per machine/vehicle
- working regime
- operating conditions

The fuel used shall be diesel fuel with a maximum sulphur content of 0,2%

The calculation formula is:

$E_i = FE_i \times N_i \times CC_i$

where: E_i = pollutant mass flow rate

FE_i = emission factor corresponding to the pollutant and the category of the machine/vehicle

N_i = number of vehicles in the relevant category

CC_i = specific diesel consumption for the machine/vehicle category (this must be converted into kg depending on the density of the fuel used - for diesel d = 820 -845 kg/m3 (density at 15 degrees C.)

SO_2 emission calculation:

$ESO_2 = K_s \times C$ (kg)

Where:

E SO_2 - SO_2 emission

Ks - S content of fuel, expressed in relative mass (kg/kg); for diesel used $K_S = 0,002$

C - fuel consumption (kg)

Emission factors are used to determine the quantities of pollutants emitted into the atmosphere:

Table 25 - Emission factors

	Mass flow (g/h)						
	NO_x	CH_4	VOC	CO	N_2O	CO_2	SO_2
FE g/km	1.44	0.005	0.42	1.58	0.017	284	-
FE g/kg fuel	15.9	0.055	4.64	17.5	0.188	3138	-

Table 26 - Mobile emission sources

Source	Pollutant	NO_x	CH_4	VOC	CO	N_2O	CO_2	SO_2
	FE g/kg fuel	15.9	0.055	4.64	1.58	0.188	3138	2
	hourly diesel consumption l/h - kg/h	Mass flow (g/h)						
trucks	16 – 13.6	216.24	0.74	63.1	21.48	2.55	42676.8	27.2
forklift	6 – 5.1	81.09	0.28	23.66	8.05	0.95	16003	10.2
Total	22 – 18.7	297.33	1.02	86.76	29.53	3.5	58679.8	37.4

Bearing in mind the following:

- in reality the mass flow rates of these pollutants are much lower because the machines will never work all at the same time
- pollutants released in exhaust fumes are released freely into the atmosphere
- dispersion conditions at the site under consideration are very good
- the quantities of dust released during the works and transport are very low, as the site will be worked on only concrete platforms and vehicles will be driven only on asphalt or concrete roads

it is estimated that the pollution generated for the environmental factor air at this stage will be insignificant and will not cause discomfort.

Facilities for the containment, discharge and dispersion of pollutants in the environment

For mobile sources - all vehicles and machinery that will be used, both during the project implementation phase and during operation, will be equipped with low emission engines, according to national standards harmonized with European standards, starting from EURO 4.

For stationary sources - the incinerator to be installed and commissioned:

The IE 1000R-300 incinerator is equipped with:

- secondary combustion chamber with features:
  - V = 9.7 m3 equipped with 1 burner to burn the flue gases from the primary chamber
  - secondary combustion chamber temperature - 1100°C
  - gas retention time in the secondary combustion chamber - 2 seconds
- dry absorbing flue gas cleaning/washing system comprising:
  - flue gas cooling system;
  - dry absorbing system for flue gas cleaning;
  - dry particle filtration system;
  - exhaust fan for exhausting combustion gases;
  - flue gas chimney and chimney connector with features:
    - height H = 10 m
    - diameter Ø =0.5 m
    - the outlet area S = 0.196 m^2

5.6. MATERIAL GOODS

No demolition works are required for the implementation of the project under consideration. The project does not affect fixed or tangible assets of an inventory nature.

5.7. CULTURAL HERITAGE

On the territory of Giurgiu municipality there are objectives included in the List of Historical Monuments, updated by the Ministry of Culture, Religious Affairs and National Heritage through the National Institute of Historical Monuments, by Order no. 2361/2010 for the amendment of Annex no. 1 to the Order of the Minister of Culture and Religious Affairs no. 2314/2004 on the approval of the List of Historical Monuments, updated, and the List of Disappeared Historical Monuments[27], but they are not in the vicinity of the site. The present project will operate on the industrial platform of the municipality, with no direct link to a cultural heritage. The most of the Historical Monuments are located in the eastern part of the city, about 2.5 km away.

Thus, the implementation of the project does not affect the cultural heritage.

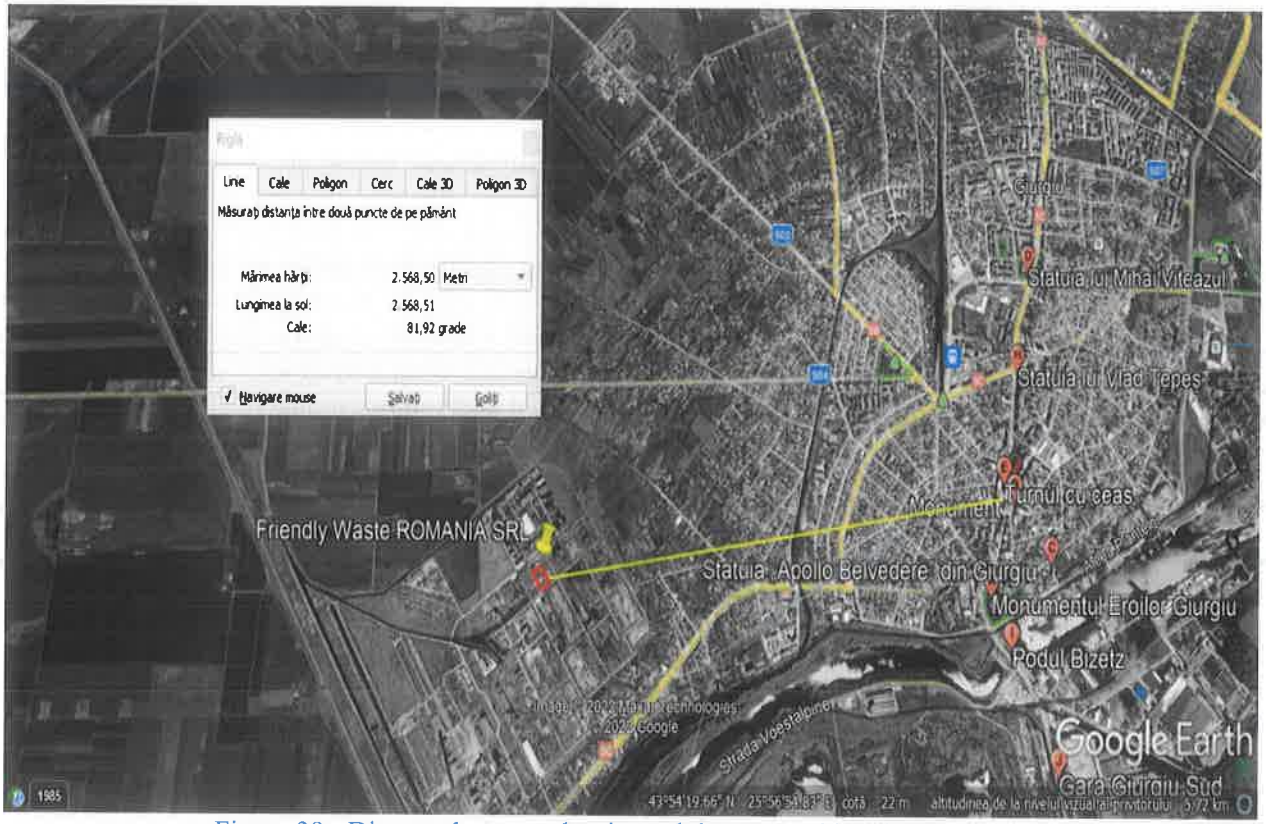


Figure 29 - Distance between the site and the nearest historical monument

[27] The full list of historic monuments is available on the Ministry of Culture website: www.cultura.ro and http://patrimoniu.gov.ro/ro/monumente-istorice/lista-monumentelor-istorice.

5.8. LANDSCAPE

The administrative location of the project site is in the south-eastern part of Giurgiu municipality, Giurgiu county.

The location of the analyzed project in relation to Giurgiu Municipality is represented in the following figure:

Figure 30 - Location of the project in relation to Giurgiu Municipality (Source: Google Earth)

The landscape of Giurgiu municipality is anthropic, specific to urban localities.

The whole south-western part of the municipality (the area where the incinerator is to be located) is marked by a desolate landscape (which was once heavily industrialized) caused by the polluting activities that took place in the past and whose traces are still visible today. In the southern part of the project site (of the industrial platform no. 2 of the former chemical plant) there is platform no. 1 of the former chemical plant and in the western part there is CET Giurgiu.

The implementation of the project can have a positive impact on the landscape by constructing a modern building, which also involves upgrading the access roads.

6. DESCRIPTION OF THE SIGNIFICANT ENVIRONMENTAL EFFECTS THAT THE PROJECT MAY HAVE

Impact assessment - exploitation phase of the project

The assessment of the impact on the environmental factor air is based on pollution indices.

Activities that will generate sources of air pollution are those related to:

- combustion of fuel (LPG) in the incinerator
- burning waste in the incinerator - 300 kg/h
- on-site traffic (vehicles entering and leaving the site carrying waste for disposal on site, removal of ash and waste from the site, internal transport)

Centralized data for pollutants emitted from stationary and mobile sources are presented in the tables below:

- stationary sources of directed pollution:

Table 27 - Mass flow rates and concentrations of pollutants emitted to the atmosphere during operation under load without additional air supply

Source name	Pollutant	Mass flow (g/h)	Poluuted gas/air flow rate (m^3/h)	Emission concentration (mg/m^3)[28]	VLE[29] (mg/m^3)	Outlet point
LPG combustion + waste	NO_x	144	2416	60	200	Flue gas exhaust stack incinerator
	SO_2	5.75		2.4	50	
	CO	187.9		78.3	-	
	PST	2.9		1.2	5	
	VOC	0		0	n.n.	
	HCl	13		5.38	10	
	HF	0.097		0.04	1	
	COT	11.11		4.6	10	

Table 28 - Mass flow rates and concentrations of pollutants emitted to the atmosphere during load operation with supplementary air supply

Source name	Pollutant	Mass flow (g/h)	Poluuted gas/air flow rate (m^3/h)	Emission concentration (mg/m^3)[30]	VLA[31] (mg/m^3)	Outlet point
LPG combustion + waste	NO_x	144	5000	28.8	200	Flue gas exhaust stack incinerator
	SO_2	5.75		1.15	50	
	CO	187.9		37.58	-	
	PST	2.9		0.58	5	
	VOC	0		0	n.n.	
	HCl	13		2.6	10	
	HF	0.097		0.019	1	
	COT	11.11		2.22	10	

[28] the worst-case situation is considered when no additional air is added (by forced injection) to the fuel combustion process

[29] Daily average limit values cf Annex 6, L 278/2013, reference conditions T = 273 ^{oK}, P = 101,3 kPa, dry gas, oxygen content 11 %

[30] the situation when additional air is added (by forced injection) to the fuel combustion process is considered

[31] Daily average limit values cf Annex 6, L 278/2013, reference conditions T = 273 ^{oK}, P = 101,3 kPa, dry gas, oxygen content 11 %

Table 29 - Pollutant mass flow rates - stationary directed pollution sources

Source name	Pollutant	Mass flow (mg/h)	Poluuted gas/air flow rate (m^3/h)	Emission concentration (mg/m^3)[32]	Alert threshold (mg/m^3)	VLA[33] (mg/m^3)
Flue gas exhaust stack incinerator	NOx	0, 08	5000	0.00005	245	350
	SO2	-		-	24.5	35
	CO	0.006		0.000004	70	100
	PM10	0.034		0.00002	3.5	5
	VOC	-			n.n.	n.n.

Table 30 - Pollutant mass flows - mobile pollution sources

Source		Mass flow (g/h)						
		NO_x	CH_4	VOC	CO	N_2O	CO_2	SO_2
	FE g/kg fuel	15.9	0.055	4.64	1.58	0.188	3138	2
	hourly diesel consumption l/h - kg/h							
trucks	16 – 13.6	216.24	0.74	63.1	21.48	2.55	42676.8	27.2
forklift	6 – 5.1	81.09	0.28	23.66	8.05	0.95	16003	10.2
Total	22 – 18.7	297.33	1.02	86.76	29.53	3.5	58679.8	37.4

Pollution indices for pollutant emmissions - incinerator.
Ip NOx = (0.08 mg/m3: 350 mg/m3) x 100 = 2,28%
Ip CO = (0.006 mg/m3: 100 mg/m3) x 100 = 0,006%
Ip particles = (0.034 mg/m3: 5 mg/m3) x 100 = 3,52%
Ip HCl = (5.38 mg/m3: 10 mg/m3) x 100 = 53,8%
Ip HF = (0.04 mg/m3: 1 mg/m3) x 100 = 4%
Ip COT = (4.6 mg/m3: 10 mg/m3) x 100 = 46%

Pollution indices for pollutant emissions - incinerator with additional air supply.
Ip NO_x = (28.8 mg/m3: 200 mg/m3) x 100 = 14,4%
Ip SO_2 = (1.15 mg/m3: 50 mg/m3) x 100 = 2,3%
Ip particles = (0.58 mg/m3: 5 mg/m3) x 100 = 11,6%
Ip HCl = (2.6 mg/m3: 10 mg/m3) x 100 = 26%
Ip HF = (0.019 mg/m3: 1 mg/m3) x 100 = 1,9%
Ip COT = (2.22 mg/m3: 10 mg/m3) x 100 = 22,2%

Emission credit notes - incinerator

Table 31 - Emission credit ratings - incinerator without additional air supply

Indicator	Ip Value	Nb Note
NO_x	30%	8
SO_2	4,8%	9

32 the worst-case situation is considered when no additional air is added (by forced injection) to the fuel combustion process
33 Reference conditions T = 273 oK, P = 101.3 kPa, dry gas, oxygen content 11%

Suspended powders	24%	8
HCl	53,8%	8
HF	4%	9
COT	46%	8

Nb incinerator[1] = 8.33

Table 32 - Emission credit notes - incinerator with supplementary air supply

Indicator	Ip Value	Nb Note
NO_x	14,4%	9
SO_2	2,3%	9
Suspended powders	11,6%	9
HCl	26%	8
HF	1,9%	9
COT	22,2%	8

Nb incinerator[2] = 8.66

Pollution indices for pollutant immissions - incinerator[34]

Ip NO_x = (0.8 µg/m3: 200 µg/m3) x 100 = 0.4%
Ip CO = (0.4 µg/m3: 10000 µg/m3) x 100 = 0.004%
Ip PM = (0.02 µg/m3: 50 µg/m3) x 100 = 0.04%
Ip SO_2 = (0.04 µg/m3: 350 µg/m3) x 100 = 0.011%

Credit notes granted for immissions - incinerator

Table 33 - Credit ratings for immissions - incinerator

Indicator	Ip Value	Nb Note
NO_x	0,4%	9
CO	0,004%	9
Suspended powders	0,04%	9
SO_2	0,011%	9

Nb incinerator = 9

The notes of good standing for immissions at the border with Bulgaria[35]

Ip NO_x = (0.4 µg/m3: 200 µg/m3) x 100 = 0.2%
Ip CO = (0.1 µg/m3: 10000 µg/m3) x 100 = 0.001%
Ip PM = (0.01 µg/m3: 50 µg/m3) x 100 = 0.02%
Ip SO_2 = (0.02 µg/m3: 350 µg/m3) x 100 = 0.0057%

Indicator	Ip Value	Nb Note
NO_x	0,2%	9
CO	0,001%	9
Suspended powders	0,02%	9
SO_2	0,0057%	9

Nb $_{\text{border immissions}}$ = 9

[34] the values determined at the nearest dwelling boundary shall be used
[35] the values at the border with Bulgaria obtained by mathematical modelling are used

Credit ratings for the air environmental factor

Table 34 - Credit ratings for the environmental factor air without additional air input to the incinerator combustion system

Indicator	Nb Note
Emissions	8.33
Immissions	9

Nb air 1 = 8.67

Table 35 - Credit ratings for the environmental factor air with additional air input to the incinerator combustion system

Indicator	Nb Note
Emissions	8.66
Immissions	9

Nb air2 = 8.83

The environmental factor air will be affected by the project within acceptable limits, with no quantifiable effects

Credit ratings for the air environmental factor

Table 36 - Credit ratings for the environmental factor air at the border with Bulgaria

Indicator	Nb Note
Emissions	-
Immissions	9

$Nb_{\text{border air}} = 9$

The air environmental factor will be affected by the project within acceptable limits, with no quantifiable effects

Human settlement environmental factor

Potential sources impacting human settlements

Human settlements can be affected by air quality (concentration of pollutants in the air) and noise.

Air quality

Air Quality Goodness Score awarded on the basis of previously calculated pollution indices for pollutant immissions.

Nb air immissions = 9

Noise

The estimated noise level, due to the sources in the target, in relation to the regulated limits according to STAS 10009 - 2017 is:

Table 37 - Estimated noise level

generating factor	zone	Lech. calculated dB(A)	Lech. admitted dB(A)
traffic in the premises	at the edge of the premises	49.3	65
	at the boundary of the nearest residential area	< 35	45
incinerator operation	at the edge of the premises	59.7	65
	at the boundary of the nearest residential area	< 35	45

The calculated noise level from the enclosed traffic source is within the limits regulated by STAS 10009-2017 both at the enclosure boundary and at the nearest protected receptor.

Impact assessment

The noise goodness grades are awarded based on the scale in the following table:

Table 38 - Noise Goodness Ratings

Nb	Lech enclosure boundary dB(A)	Lech protected receiver limit dB(A)	Effects on the body
10	< 50	< 35	0 - 30 dB(A) quiet area
9	50 – 55	35 – 40	
8	55 – 60	40 – 45	30 - 60 dB(A) area of mental effects
7	60 – 65	45 – 50	
6	65 – 70	50 – 55	
5	70 – 75	55 – 60	60 - 90 dB(A) area of physiological effects
4	75 – 80	60 – 65	
3	80 – 90	65 – 75	
2	90 – 100	75 – 90	90 –120 dB(A) area of otological effects
1	> 100	> 90	

For the assessment of noise impacts on human settlements, only the noise level at the edge of the settlement area is of interest.

The noise goodness credit ratings are:

Table 39 - Noise goodness credit ratings

generating factor	zone	Lech. value dB(A)	Nb Note
traffic in the premises	at the boundary of the nearest residential area	< 35	10
incinerator operation	at the boundary of the nearest residential area	< 35	10

Nb noise = 10

Noise goodness credit ratings at the border with Bulgaria:
$Nb_{\text{border noise}} = 10$

Table 40 - Environmental factor goodness credit ratings for human settlements

Indicator	Goodness scale
air - immissions	9
noise	10

Nb human settlements = 9.5
Goodness ratings for the environmental factor human settlements at the border with Bulgaria:

Table 41 - Environmental factor goodness notes for human settlements at the border with Bulgaria

Indicator	Goodness scale
air - immissions	9
noise	10

$Nb_{\text{human settlements border}} = 9.5$

The environmental factor of human settlements will practically not be affected by the project.

Soil, subsoil, biodiversity and landscape environmental factors
Sources of soil, subsoil, biodiversity and landscape pollution
The project under consideration is being built on land that is currently used as an abandoned cow barn. The ground will not be affected by the construction of this objective because all the construction and equipment installation work will be carried out on concrete platforms. Similarly, once the construction works is completed, activities will also take place on concrete platforms.

Biodiversity and landscape will be positively affected, as described in the previous chapters, but to a very limited extent.
The waste incineration activity has no negative impact on geological underground components.

Impact assessment
The impact assessment on the soil, subsoil, biodiversity and landscape environmental factors is based on quality indices.

Table 42 - Impact assessment matrix

Generating action or sources	Effects on environmental factors			
	soil	subsoil	biodiversity	landscape
Location and layout of the perimeter built	+	+	+	+
Mass discharges of pollutants in the atmosphere	0	0	0	0
Waste generation and disposal	+	+	+	+
Mass discharges of pollutants in the emissary	+	+	+	+
Environmental damage or accidents	+	+	+	+
SIZE OF EFFECTS	+4	+4	+4	+4
Quality indicators	+ 0.25	+ 0.25	+ 0.25	+ 0.25

The quality indicators are:
for soil: Ic soil = 1/±E = 1/+4 = + 0.25
for the subsoil: Ic subsoil = 1/±E = 1/+4 = + 0.25
for the biodiversity: Ic biodiversity = 1/±E = 1/+4 = +0.25
for landscape: Ic biodiversity == 1/±E = 1/+4 = +0.25

Table 43 - Credit ratings for the environmental factor soil - subsoil

Indicator	Ic value	Nb Note
Ic soil	+ 0.25	9
Ic subsoil	+ 0.25	9
Ic biodiversity	+ 0.25	9
Ic landscape	+ 0.25	9

Nb soil, subsoil, biodiversity, landscape = 9
The soil, subsoil, biodiversity and landscape environmental factor will be affected by the project within acceptable limits, the impact will be reduced.

Impact at the border with Bulgaria

Table 44 - Impact assessment matrix

Generating action or sources	Effects on environmental factors			
	soil	subsoil	biodiversity	landscape
Location and layout of the perimeter built	0	0	0	0
Mass discharges of pollutants in the atmosphere	0	0	0	0
Waste generation and disposal	0	0	0	0
Mass discharges of pollutants in the emissary	0	0	0	0
Environmental damage or accidents	0	0	0	0
SIZE OF EFFECTS	0	0	0	0
Quality indicators	0	0	0	0

The quality indicators are:
for soil: Ic soil = 1/±E = 0
for the subsoil: Ic subsoil = 1/±E = 0
for the biodiversity: Ic biodiversity = 1/±E = 0
for landscape: Ic landscape = 1/±E = 0
The credit ratings for the soil - subsoil environmental factor are:

Table 45 - Credit ratings for the environmental factor soil - subsoil

Indicator	Ic value	Nb Note
Ic soil	0	10
Ic subsoil	0	10
Ic biodiversity	0	10
Ic landscape	0	10

Nb soil, subsoil, biodiversity, landscape = 10

The environmental factor soil, subsoil, biodiversity, landscape at the border with Bulgaria will not be affected by the project.

Assessing the size of the overall impact

The Rojanschi method 36 based on the determination of the global pollution index IPG is used to assess the environmental impact of the project.

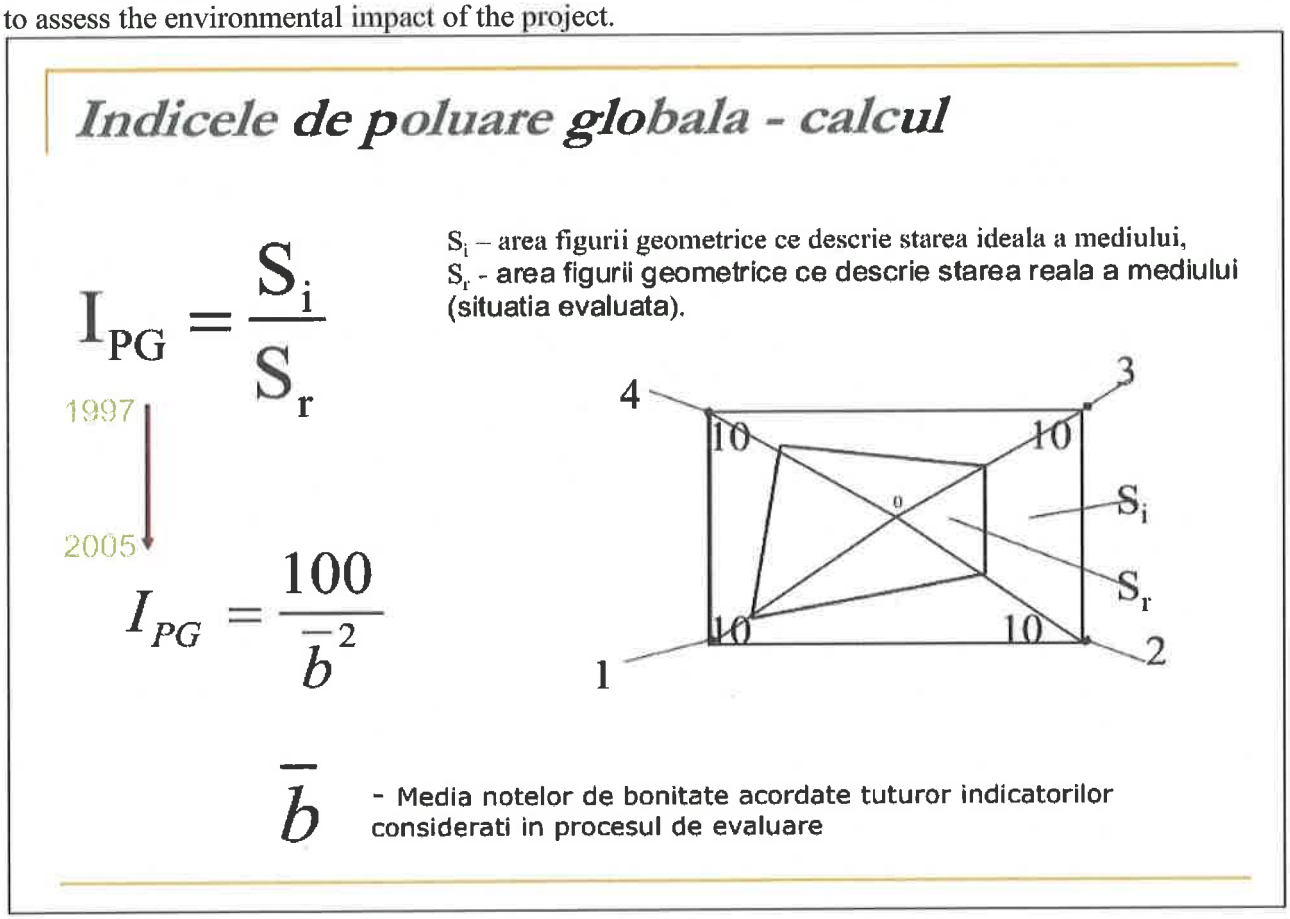


Figure 31 - Global pollution index - calculation

To quantify the impact of the activity on the environment or taken into account:

- value of pollution indices by environmental factors
- goodness scale rated from 1 to 10 for Ip values
- value of quality indices by environmental factors
- goodness scale rated from 1 to 10 for Ic values
- The global pollution index, as a result of the simulation of the synergistic effect of pollutants, results from a ratio between the ideal (natural) state and the actual state, i.e. the pollution state, expressed by the goodness notes corresponding to the pollution and quality indices.

IPG = SI/SR

36 Illustrative method for global assessment of the state of environmental quality (Rojanschi 1997 and de Popa 2005)

The ideal state is represented graphically by a regular geometric figure with equal radii, having the value of 10 units of goodness.

By joining the points resulting from the location of the values expressing the actual state, an irregular geometric figure with smaller area is obtained, inscribed in the regular geometric figure of the ideal state.

Table 46 - Rating scale

Value of IPG	- b	class	Degree of environmental damage
IPG = 1	10	A	The natural environment is unaffected by human activity
1 < IPG < 2	9.999÷7.072	B	The environment is affected by human activity within acceptable limits
2 < IPG < 3	7.071÷5.774	C	The environment is affected by human activity, causing discomfort to life forms
3 < IPG < 4	5.773÷5.001	D	The environment is affected by human activity, causing disturbances to life forms
4 < IPG < 6	5÷4.083	E	Environment severely affected by human activity, hazardous to life forms
IPG > 6	≤ 4,082	F	The environment is degraded, unsuitable for life forms

The goodness rates for environmental factors are:
Nb water = 8.00
Nb air = 9
Nb human settlements = 9.5
Nb soil, subsoil, biodiversity, landscape = 9

From the IPG diagram for Nb = 10 and four environmental factors we have for the ideal (natural) state
SI = 200.00 cm2

The analysis will be carried out for both situations:

1. **Incinerator operation with additional air supply to the combustion system**

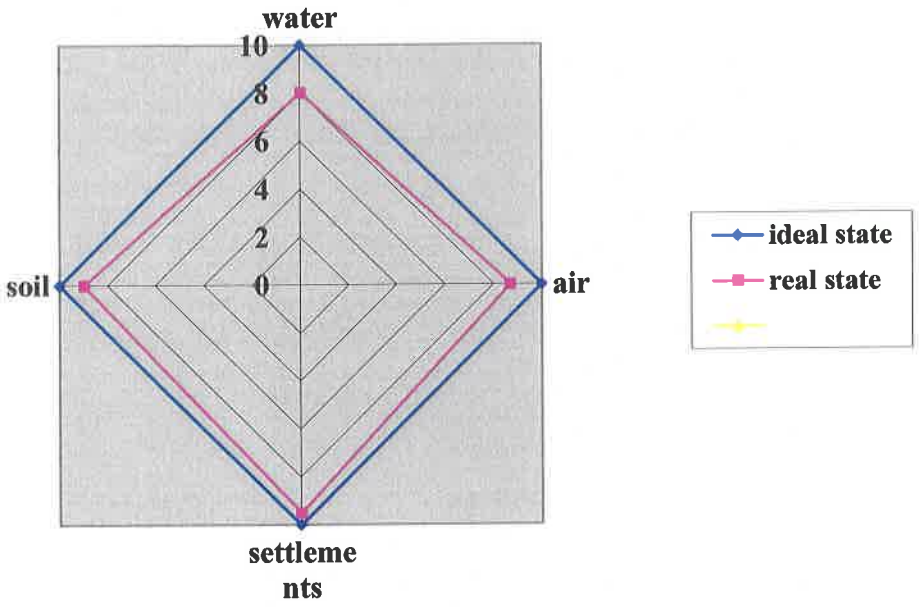


Figure 32 - IPG diagram without additional air supply to the combustion system

Table 47 - IPG diagram parameters without additional air supply to the combustion system

	A	B	C	D	E	F
1		apă	aer	aşezări	sol	
2	stare ideală	10	10	10	10	
3	stare reală	8	8.67	9.5	9	
4						
5						
6						

Point 2/ideal state point 3/ real state

From the graphical representation of the real state (inscribed in the SI diagram) built with Nb values we have:

SR = 157.5 cm^2

The following results:

IPG = and/ SR = 200.00/157.5 = 1.269

According to the rating scale, for IPG = 1.269 it follows that:

The environment is affected within acceptable limits

2. Incinerator operation with additional air supply to the combustion system

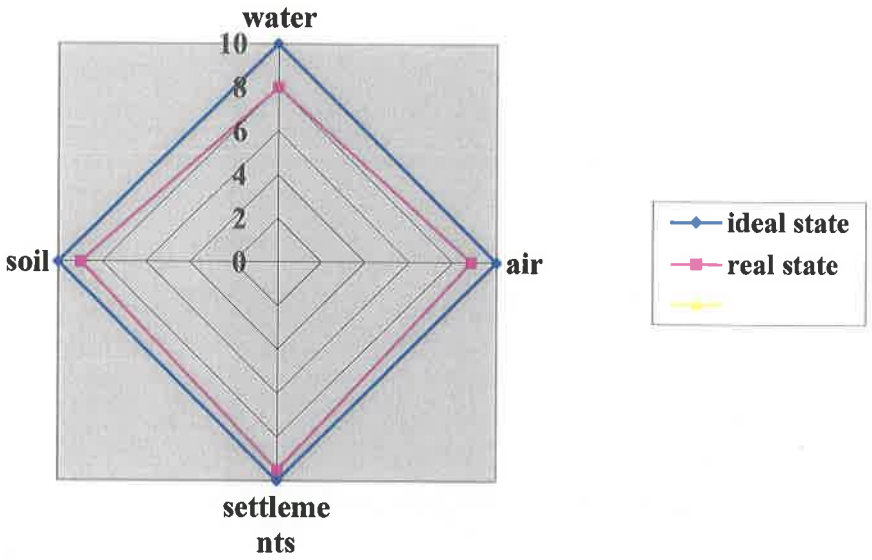


Figure 33 - IPG diagram with additional air supply to the combustion system

Table 48 - IPG diagram parameters with additional air supply to the combustion system

	A	B	C	D	E
1		apă	aer	așezări	sol
2	stare ideală	10	10	10	10
3	stare reală	8	8.89	9.5	9
4					

Sheet1
Gata
100%

From the graphical representation of the real state (inscribed in the SI diagram) built with Nb values we have:

SR = 156.01 cm^2

The following results:

IPG = and/ SR = 200.00/156.01 = 1.281

According to the rating scale, for IPG = 1.281 it follows that:

Impact assess The environment is affected within acceptable limits

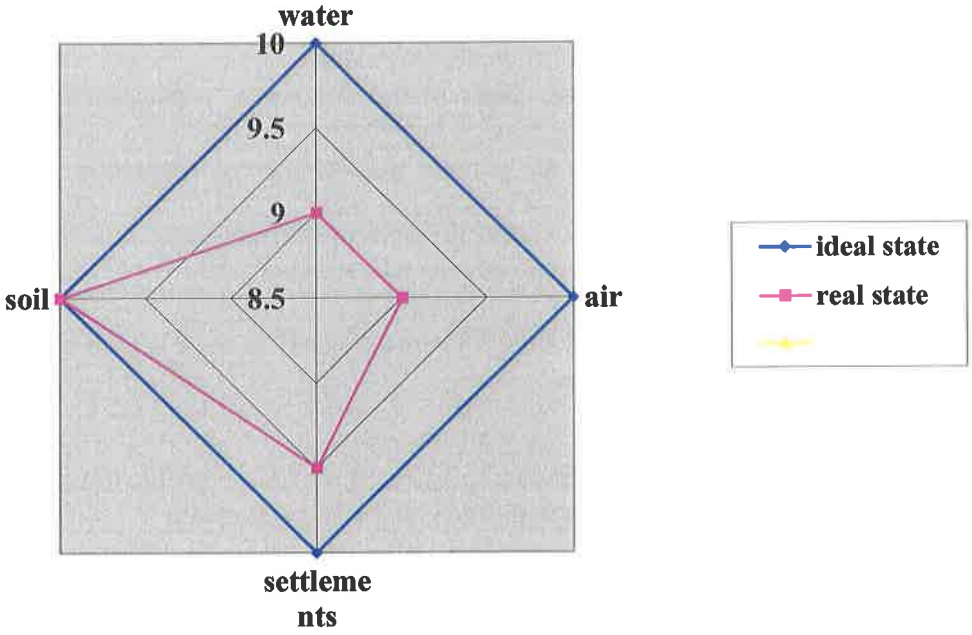
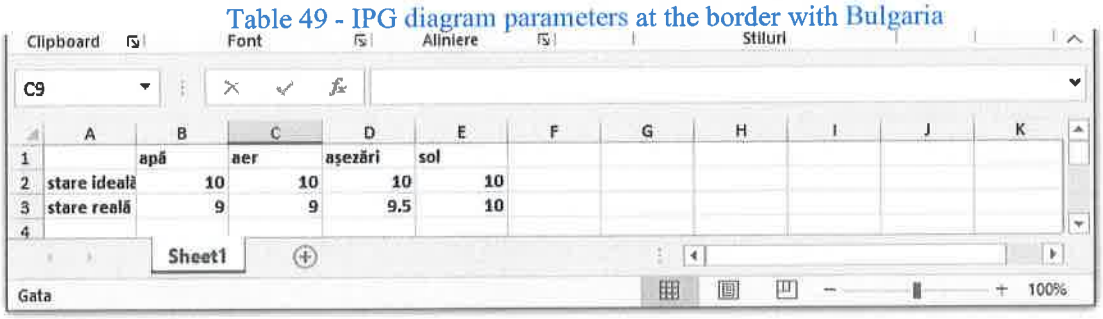


Figure 34 - IPG diagram at the border with Bulgaria

Table 49 - IPG diagram parameters at the border with Bulgaria



	A	B	C	D	E
1		apă	aer	aşezări	sol
2	stare ideală	10	10	10	10
3	stare reală	9	9	9.5	10
4					

From the graphical representation of the real state (inscribed in the SI diagram) built with Nb values we have:

SR = 175.75 cm^2

The following results:

IPG = and/ SR = 200.00/175.75 = 1.137

According to the rating scale, for IPG = 1.137 it follows that:

The environment is affected, at the border with Bulgaria within acceptable limits. The impact is low

The method for assessing the magnitude of environmental impact based on indicators that reflect the overall state of the environmental factors analyzed goes through several stages:

- determination of indicators capable of reflecting the general state of the environmental factors analyzed.
- the indicators for each environmental factor are placed on a goodness scale with scores expressing how close or far they are from ideal.
- to simulate the synergistic effect of the pollutants, a diagram is constructed with the goodness scales obtained.

The indicators used to assess the general state of the environmental factors affected by the activity of the objective are:

Pollution indices Ip, which represents the ratio of the maximum concentration of the pollutant to the maximum concentration allowed by the regulatory standards:

Ip = (Cmax/C admitted) x 100

Depending on the Ip value, the state of environmental damage is assessed:

Table 50 - Ip value

Ip = (0÷1) x 102	The environment is affected within acceptable limits and the effects are positive or negative without being harmful
Ip > 1.0 x 102	The environment is affected above the permitted limits, negative effects are assessed according to the degree (%) of excedance

Quality indices Ic, which relate to the size of the effects

Ic = 1/±E

± E - effect size determined by the evaluation matrix

Quantifying effects in quantitative sizes (E) allows their aggregation and averaging on a scale of type:

\+ positive influence
0 no influence
\- negative influence

Depending on the Ic value, the state of environmental damage is assessed:

Table 51 - Assessment of the state of environmental damage according to the Ic value

Ic = 0...+1	the influences are positive and the environment is affected within acceptable limits
Ic = -1...0	the influences are negative and the environment is affected beyond the acceptable limits
Ic = 0	unaffected environmental condition

The goodness scale for pollution indices is:

Table 52 - Pollution index goodness scale

Goodness scale	I p value (%)	Effects on humans and the environment
10	0	Environment unaffected by human activity Environmental condition: natural
9	(0 – 0.2) x 100	Environment affected by human activity No measurable effects
8	(0.2 – 0.7) x 100	The environment is affected within permissible limits, level 1 Alert threshold: with potential effects

7	(0.7 – 1.0) x 100	The environment is affected within permissible limits, level 2 Intervention threshold: with significant effects
6	(1.0 – 2.0) x 100	The environment is affected within permissible limits, level 1 The effects are accentuated
5	(2.0 – 4.0) x 100	The environment is affected within permissible limits, level 2 The effects are harmful
4	(4.0 – 8.0) x 100	The environment is affected within permissible limits, level 3 Harmful effects are accentuated
3	(8.0 – 12.0) x 100	Environment is degraded, level 1 Effects are lethal at medium exposure times
2	(12.0 – 20.0) x 100	Environment is degraded, level 2 Effects are lethal at short exposure times
1	> 20.0 x 100	The environment is unsuitable for life forms

The goodness scale for pollution indices is:

Table 53 - Quality index goodness scale

Goodness scale	Ic value	Effects on humans and the environment
10	0	Environment unaffected by human activity
9	(0.0 ÷ 0.25)	Environment affected by activity within permissible limits, level 1; Large positive influences (sum of effects is large); The activity has a low impact.
8	(0.25 ÷ 0.50)	Environment affected by activity within permissible limits, level 2; Average positive influences (sum of effects is average); The activity causes a detectable impact.
7	(0.50 ÷ 1.0)	Environment affected by activity within permissible limits, level 3; Small positive influences (sum of effects is small); The activity results in a measurable impact.
6	-1.0	Environment affected by activity above permitted limits, level 1 Effects are negative, activity exceeds the regulatory norms.
5	(-1.0 ÷ -0.5)	Environment affected by activity above permitted limits, level 2 The effects are negative causing discomfort
4	(-0.5 ÷ -0.25)	Environment affected by activity above permitted limits, level 3 The negative effects are pronounced, the impact is major.

Goodness scale	Ic value	Effects on humans and the environment
3	(-0.25 ÷ -0.25/10)	Degraded environment, level 1; Effects are harmful at exposure.
2	(-0.25/10 ÷ -0.25/100)	Degraded environment, level 2; Effects are harmful at exposure environments.
1	under -0.25/100	Degraded environment, level 3; Effects are harmful at short exposure times.

Water environmental factor

Categories of wastewater discharged
- treated domestic and industrial waste water
- rainwater from the traffic lanes of means of transport

Concentrations of discharged pollutants in relation to regulated limits

The concentrations and mass flow rates of treated wastewater pollutants discharged from the catchment to the on-site treatment plant compared to NTPA 002/2005 are:

Table 54 - Concentrations and mass flow rates of treated wastewater pollutants discharged from the sewage lagoon compared to NTPA 002/2005

Pollutant	Mass flow kg/day	Conc. at the evacuation mg/l	CMA according to NTPA 002/2005 mg/l
Suspensions	5.20	116.45	350
CCOCr	19.11	427.92	500
CBO5	11.04	247.3	300
Nitrogen (as NH4+)	1.33	29.79	30
Phosphorus	0.22	4.91	5
Extractable	1.27	28.38	30
Detergents	0.03	0.65	30

The estimated concentrations and mass flow rates of rainwater pollutants discharged from the concrete pads (less those from the car wash pad discharging to the sump in the gate area with V = 10 m3 compared to NTPA 001/2005 are:

Table 55 - Estimated concentrations and mass flows of rainwater pollutants discharged from platforms compared to NTPA 001/2005

Pollutant	Mass flow g/day	Conc. at the evacuation mg/l	CMA according to NTPA 001/2005 mg/l
Suspensions	76.22	9	60
Extractable	4.235	0.5	20

Impact assessment

The assessment of the impact on the water environmental factor is based on pollution indices.

Pollution indices - treated industrial and domestic wastewater
Ip suspensions = (116,45 mg/l: 350 mg/l) x 100 = 33.27%
Ip CCOCr = (427.92 mg/l : 500 mg/l) x 100 = 85.59%
Ip BOD5 = (247.30 mg/l: 300 mg/l) x 100 = 82.44%
Ip nitrogen = (29.79 mg/l: 30 mg/l) x 100 = 99.30%
Ip phosphorus = (4.91 mg/l: 30 mg/l) x 100 = 16.37%
Extractable Ip = (28.38 mg/l: 30 mg/l) x 100 = 94.60%
Ip detergents = (0.65 mg/l: 30 mg/l) x 100 = 2.17%
Pollution indicators - rainwater from transport routes
Ip suspensions = (9 mg/l: 60 mg/l) x 100 = 15.0%
Extractable Ip = (0.5 mg/l: 20 mg/l) x 100 = 2.5%

Credit ratings awarded:

Table 56 - Credit ratings awarded

Indicator	Ip Value	Nb Note
Suspensions	33,27%	8
CCOCr	85,59%	7
CBO5	82,44%	7
Nitrogen (as NH4+)	99,30%	7
Phosphorus	16,37%	9
Extractable	94,60%	7
Detergents	2,17%	9
Suspensions	15,0%	9
Extractable	2,5%	9

$N_{bwater} = 8$

The water environmental factor will be affected by the project within acceptable limits, the activity of the objective will cause a detectable impact.

Transboundary water impact assessment:

For the assessment of the trans-boundary impact on water generated by the operation of the incinerator through the awarding of goodness notes, the following analysis is made: the wastewater from the site under consideration reaches the industrial sewerage network after having been treated in the on-site treatment plant where it undergoes an advanced treatment process in order to comply with the provisions of GD 188/2002 amended and completed by GD 325/2005, Annex 3, Table 1 (NTPA 001/2005). After treatment, the water is discharged into the Danube River.

The concentration of wastewater pollutants resulting from the site under analysis is within the maximum values regulated by GD 325/2005, Annex 2, Table 1 (NTPA 01/2005) and therefore these waters will not have a negative impact on trans-boundary waters.

The resulting wastewater flow rate at the site is 3.479 m^3/day= 0.434 m^3/hour= 0.00012 m^3/s.

The quality of the receiver (Danube river), whose average multi-annual flow[37] is 6040 m^3/s will not be affected by the wastewater resulting from the treatment of the water from the analyzed site because its flow is more than insignificant (0.00012 m3/swastewater compared to the average flow of the Danube river of 6040 m3/s) and the concentrations of pollutants when discharged into the outfall are within the legal limits (NTPA 001/2005) being efficiently treated in the treatment plant of Giurgiu municipality.

[37] Flood Risk Management Plan - Danube River

Bearing in mind the following:

- the average annual flow of the Danube River is 6040 m^3/s
- the flow of wastewater from the analyzed site treated in the site treatment plant before discharge into the natural receiver (Danube River) is 0.00012 m^3/s and is more than insignificant compared to the average annual flow of the river
- the flow of wastewater from the analyzed site and treated in its own wastewater treatment plant, before discharge into the natural receiver (Danube river), more than insignificant compared to the flow of wastewater discharged from the Giurgiu wastewater treatment plant and discharged into the Danube river as well
- the dilution effect of the water discharged into the Danube River is instantaneously analyzed by the ratio of the resulting wastewater flow at the analyzed site (0.00012 m^3/s) to the average annual flow of the Danube River (6040 m^3/s)

From the above analysis, it follows:

$Nb_{cross\text{-}border\ water} = 9$

Air environmental factor

- Sources of air pollution - the significant source of air pollution is the incinerator.
- Emission pollutant concentration in relation to regulated limits

We will do the impact assessment for operation with LPG fuel and for a combustion rate of 300 kg/h waste.

The maximum emission concentrations from the incinerator in relation to the regulated limits are shown in the following table:

Table 57 - Maximum emission concentrations from the incinerator in relation to the regulated limits

Source	Pollutant	Mass flow g/h	Emission concentration with additional air supply mg/Nm3	Emission concentration without additional air supply mg/Nm3	VLE according to Annex 6, L 278/2013 mg/Nm3
IE 1000R-300 incinerator flue gas exhaust stack	NO_x	144	28.8	60	200
	SO_2	5.75	1.15	2.4	50
	CO	187.9	37.58	78.3	-
	Particles	2.9	0.58	1.2	5
	HCl	0	2.6	5.38	10
	HF	13	0.019	0.04	1
	COT	0.097	2.22	4.6	10

The concentrations of pollutants emitted by the incinerator are within the maximum permissible limits (VLE) according to Annex 6, L 278/2013 to all indicators.

The mass flow rates of pollutants discharged into the atmosphere, calculated at maximum operating speed, are relatively low.

Concentration of pollutants in immission in relation to regulated limits

Project implementation phase

The assessment of the impact on the environmental factor air, for this stage, is achieved in terms of immission concentrations (concentration of pollutants at the respiratory level).

Only short remediation time concentrations (i.e. 1 hour) are important as they represent the highest likely respiratory concentrations due to sources operating simultaneously in the same perimeter. Consequently, only the concentrations of nitrogen oxides and sulphur dioxide for which OM 592/2002 has set maximum permissible limits for a remediation time of one hour are of interest.

Determination of pollutant concentration in immission is achieved by mathematical modelling of pollutant dispersion.

The results obtained, in relation to the maximum permitted concentrations, are shown in the table below:

Table 58 - Maximum concentrations in immission generated by the operation of engines of vehicles and machinery participating in construction activities

Source	Pollutant	$C_{maximum}$ 1 h (µg/m3)	CMA1 h (µg/m3)
All sources	NOx	103.1	200
	SO2	1.53	350

It can be observed that the values of the maximum concentrations in immission in the short remediation time (one hour) of pollutants resulting from the operation of machinery and vehicles carrying out the transport and assembly work of the IE 1000R-300 incinerator as well as the metal hall are much lower than the maximum permissible values and are recorded at a distance of 80 m from the source and only under certain meteorological conditions (lack of air currents, excessive heat, etc.) and under any other meteorological conditions the concentrations in immission are lower. At the same time, the concentration values in the immission are getting lower as the distance from the source increases.

Maximum concentrations in immission are within the maximum permitted limits for all indicators.

Air pollutant dispersion, maximum area of influence and changes in quality

Calculation of concentrations in immission was achieved only for the IE 1000R-300 incinerator by mathematical modelling of pollutant dispersion.

The concentrations in immission determined are related to the maximum permissible values provided by OM 462/1993 in conjunction with the provisions of Law 104/2011, with further amendments and completions.

A Gaussian model, i.e. the climatological model based on the Martin and Tikvart model theory, was used to determine the immission concentration fields of the pollutants discharged into the atmosphere by the sources related to the operation of the target.

This is a model for estimating long-term averaging pollutant concentrations for continuous point or surface sources.

The fundamental physical basis of the model is the assumption that the spatial distribution of concentrations is given by the Gaussian wedge formula.

Long-term average concentration

The average CA concentration in a receiver at distance r from a source and at height z above the ground is given by the relation:

$$\overline{C}_A = \frac{16}{\pi}\int_0^{\infty}\left[\sum_{k=1}^{16} q_k(\rho)\sum_{l=1}^{8}\sum_{m=1}^{7}\Phi(k,l,m)S(\rho,z;u_l,P_m)\right]d\rho$$

where:

- k = index for wind speed sector
- $q_k(\rho) = \int Q(\rho,\theta)d\theta$ for sector k
- $Q(\rho,\theta)$ = emission per unit time of the surface source
- ρ = receiver distance for an infinite surface source
- θ = the angle in polar coordinates centered on the receiver
- l = index for wind speed class

- m = index for stability class
- Φ(k,l,m) =frequency function of weather states
- S(ρ,z;Ul,Pm)= function defining the dispersion
- z = receiver height above ground
- Ul= representative wind speed
- Pm=stability class

For point sources, the average CP concentration due to a number of **n** sources is given by the relation:

$$\overline{C}_P = \frac{16}{2\pi} \sum_{n=1}^{N} \sum_{l=1}^{8} \sum_{m=1}^{7} \frac{\Phi(k_n,l,m)\ G_n\ S(\rho_n,Z;u_l,P_m)}{\rho_n}$$

where:

- kn = wind sector for n source
- Gn = emission for source **n**
- ρn = receiver distance of **n** source

If the receiver is on the ground (breathing level), then z=0 and the form of the function S (ρ,z;ul, Pm) will be:

$$\overline{C}_P = \frac{16}{2\pi} \sum_{n=1}^{N} \sum_{l=1}^{8} \sum_{m=1}^{7} \frac{\Phi(k_n,l,m)\ G_n\ S(\rho_n,Z;u_l,P_m)}{\rho_n}$$

if sz(r) < 0.8 L and

$$S(\rho,0;u_l,P_m) = \frac{2}{\sqrt{2\pi}u_l\,\sigma_z(\rho)} \exp\left(-\frac{0.692}{u_l\,T_{1/2}}\right) \exp\left(-\frac{H^2}{2\sigma_z^2}\right)$$

if σz(ρ) > 0.8 L
where:

- σz(ρ) = vertical dispersion function, i.e. standard deviation of concentration in the vertical plane
- h = effective height of the source
- L = mixing height at noon
- T1/2 =half-life of the pollutant.

The possibility of the pollutant disappearing by physical or chemical processes is given by the expression:

exp (-0.692/ul Q1/2).

The total concentration for a given averaging period is the sum of the concentrations due to all sources for that period.

Input data includes information on:

Calculation grid - The model allows the calculation of the average pollutant concentration at any point at a certain distance from the source/sources by taking into account the contribution of all sources. As a result, it is possible to calculate concentrations over an area around the source. For this purpose, the area of interest is delimited and a grid, usually quadratic, is fixed on its surface, the nodes of which constitute the receivers. The number of nodes and the grid pitch are chosen according to the characteristics of the source, the area of interest and the issue to be answered. The grid will have an

origin and a coordinate system with the Ox axis to the east and the Oy axis to the north, according to which the coordinates of the sources and nodes are determined.

Emission data include source characteristics: geometric height, diameter or area of emission, velocity and temperature of pollutant discharge.

Meteorological parameters are entered as the frequency function □ (k,l,m) of the triplet wind direction, wind speed class and stability class, established over long (multi-annual) data series.

For example, if working on 16 wind sectors, 8 speed classes and 7 stability classes, the table of frequency function values contains 896 entries.

Calculation of pollutant concentrations for the specific sources of the objective were made on a 0.8 km x 1.0 km quadratic grid with 10 m grid spacing, with the sources in the centre.

Short-term maximum concentration

For the assessment of short-term averaging concentrations, a model of up Gaussian type was used, which is much more appropriate than the climatological model (which by averaging on sector sometimes underestimates short-term concentrations).

The model uses as input data the pollutant emission characteristics (amount of pollutant discharged into the atmosphere per unit time, exhaust height, temperature and exhaust gas velocity) and the decisive meteorological factors in the pollutant distribution: wind speed, degree of thermal stratification of the atmosphere.

The relationship for calculating the pollutant concentration at a point is:

$$C(x,y,z) = \frac{Q}{\pi u \sigma_y \sigma_z} \cdot \exp\{-\frac{y^2}{2\sigma_y^2}\} \cdot \exp\{-\frac{H^2}{2\sigma_z^2}\}$$

where:

- Q - pollutant emission in g/s
- H - the effective height of the source, as a function of temperature and exhaust gas velocity, the inside diameter at the top and the constructed height of the stack
- u - wind speed at source height
- σ_y, σz - dispersion parameters depending on the atmospheric stratification class, distance from source and emission environment (urban/rural)

Pollutant plume over-elevation, a decisive parameter in the assessment of pollutant concentrations at a given distance from the source, was determined with the Briggs formula corrected for stable atmospheric stratification. The dispersion parameters □y and □z were determined with the formulas recommended by OMM 1982.

Calculations were performed on the wind axis, where concentrations are highest for all possible meteorological conditions.

To evaluate the level of pollutant emissions resulting from the operation of the IE 1000R-300 incinerator, theoretical calculations were made for pollutant emissions based on fuel consumption and type of fuel used, calorific value, waste gas discharge temperature and emission factors.

The calculation was performed for a calorific value of the fuel used (LPG of 11.872 kcal/kg (45 Mj/kg) - lower calorific value of the fuel).

The combustion source consists of the burners of combustion and afterburners. The flue gases are discharged through the flue gas plant (D = 0.5 m; H = 10 m) after passing through the scrubbing system. Given the facilities for flue gas desulphurisation (flue gas scrubber-dryer) (sulphur <10 ppm, see prospectus) the emission factor for sulphur oxide can be calculated from the sulphur content of the fuel using the formula:

FE SO_2 = [S] x 20,000/CVNet (Corinair 2013, 1.A.1- Chapter 6.3.2) where:

- FE SO_2 -SO_2 emission factor (g/GJ)

- [S] - sulphur content of the fuel (% g/g): LPG contains sulphur <10 ppm, i.e. at an LPG density of 537 kg/m^3, a sulphur content of 0.00003 % (% gravimetric)
- CVNet - lower calorific value of fuel (Gj/t, net value) = 45 Gj/t

FE SO_2 = 0.013 g/GJ < compared to the emission factor for LPG set according to the EMEP/EEA Guideline requirements at 0.067 g/GJ.

For safety, the evaluation calculations for emission concentrations were made for the most disadvantageous emission factor.

For the calculation of flue gas concentrations resulting from the combustion of fuel in the incinerator, the following aspects were taken into account: the gaseous emissions resulting from the combustion chamber where fossil fuels + combustible materials are converted into heat are composed of:

- nitrogen - 78% of the air introduced into the enclosure, which does not take part to combustion
- CO2 - the result of carbon oxidation (which is the energy source in the thermal process)
- H2O - the result of hydrogen combustion.

Determination of the amount of compounds and airflow

Below, it is a theoretical calculation for the exclusive combustion of the combustible substance

In the composition of LPG (the calculation is achieved for propane C3H8), we have two main elements, namely carbon 75%, hydrogen 24% and several secondary elements, the only notable one being sulphur 0.00003%.

Carbon is oxidized and CO2 is produced

$C + O2 \rightarrow CO2$

If we enter the molecular mass, we have:

$12 + 32 \rightarrow 44$

This means that for 12 kg of carbon, 32 kg of oxygen are needed to produce 44 kg of CO2.

In our case we have 1 kg of fuel, resulting in:

$0.75 + 2.0 \rightarrow 2,75$

So 2.0 kg of oxygen is needed to burn the carbon in one kilogram of fuel (LPG)

Hydrogen is oxidized and H2O is produced

$2H2 + O2 \rightarrow 2H2O$

If we enter the molecular mass, we have:

$4 + 32 \rightarrow 36$

In our case we have 1 kg of fuel, resulting in:

$0.25 + 0.96 \rightarrow 1.21$ kg

So 0.96 kg of oxygen is needed to burn the carbon in one kilogram of fuel (LPG)

Sulphur is oxidised and SO2 results

$S + O2 \rightarrow SO2$

If we enter the molecular mass, we have:

$32 + 32 \rightarrow 64$

In our case we have 1 kg of fuel, resulting in:

$0.00003 + 0,003 \rightarrow 0,00303$

All masses summed C + H + S (2.17 + 1.08 + 0.00303) gives 3.236 kilograms of oxygen needed to burn 1 kg of LPG.

Since oxygen is present in the air at a concentration of 21%, the determination is achieved 3.236 ÷ 0.21= 15.4 kg of air.

Under normal conditions, air has a density of 1.3 kg/m^3, so we will need 20 m^3 of air for every kg of fuel or 16.6 m3 for every liter.

These are stoichiometric values. In a combustion process we will always have 20% excess air.

The molar mass of C3H8 is 3 x 12 + 8 x 1 = 44 (g/mol).

Under normal conditions c.n., the volume of one mole of gas is 22.4 liters.

The equation for the propane combustion reaction is:

$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O + Q$ (this reaction is exothermic)

1 x 44 g C_3H_8 reacts with 5 x 22.4 liters O_2

1000 g C_3H_8 will react with:

1000 x 5 x 22.4/44 = approx. 2545,45 liters O_2

When calculating the flue gas, nitrogen, which does not change significantly in the combustion process, will be taken into account, i.e. the amount entering the process will be equal to the resulting amount, i.e. 0.78 of the total volume.

The above are phenomena that occur under theoretical, laboratory conditions. In practical applications, two other phenomena occur:

- a small part of the nitrogen will combine with oxygen to produce nitrogen oxides - NOx
- a small part of the carbon will form CO (due to the speed of the combustion process not all C atoms will get 2 O atoms)
- it is also taken into account that H_2O (resulting from the oxidation of hydrogen) is in a gaseous state (0.8 kg/m3)

Calculation of the concentrations of noxae in the flue gas, at emission, is presented centrally in the table below.

To determine the parameters needed in the mathematical modelling process, the following were used:

1. climate parameter values for the year 2022 recorded at the meteorological station located on Sos. Sloboziei, nr. 195, municipality of Giurgiu
2. information from March 2022 factor change modelling:

- wind speed in relation to prevailing directions

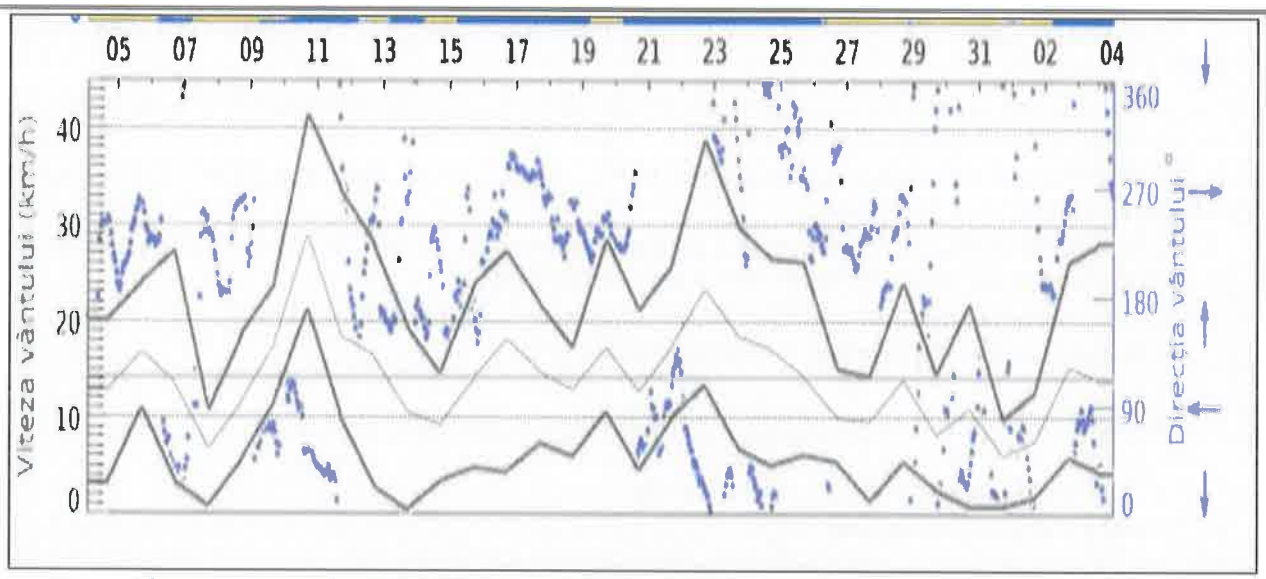


Figure 35 - Modelling of wind speed variation in relation to prevailing directions for March 2022

- precipitation amounts and atmospheric cloudiness

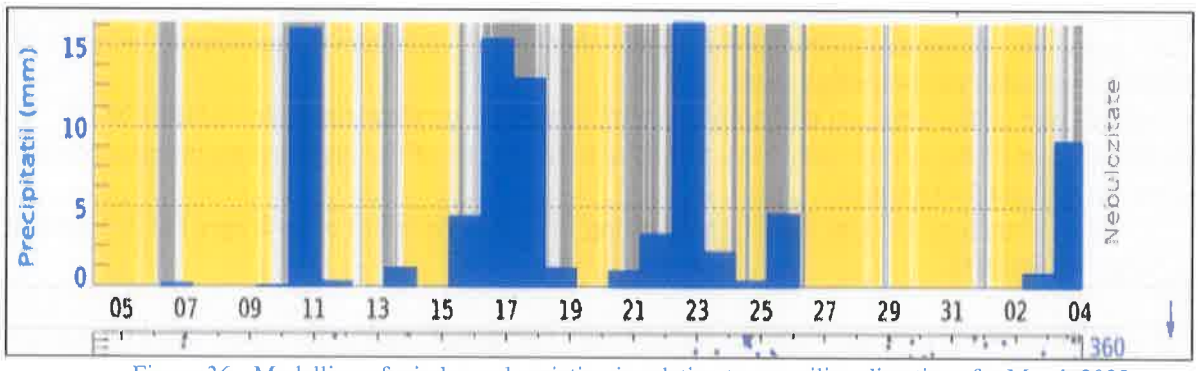


Figure 36 - Modelling of wind speed variation in relation to prevailing directions for March 2022

- variation of average temperatures in relation to humidity variation

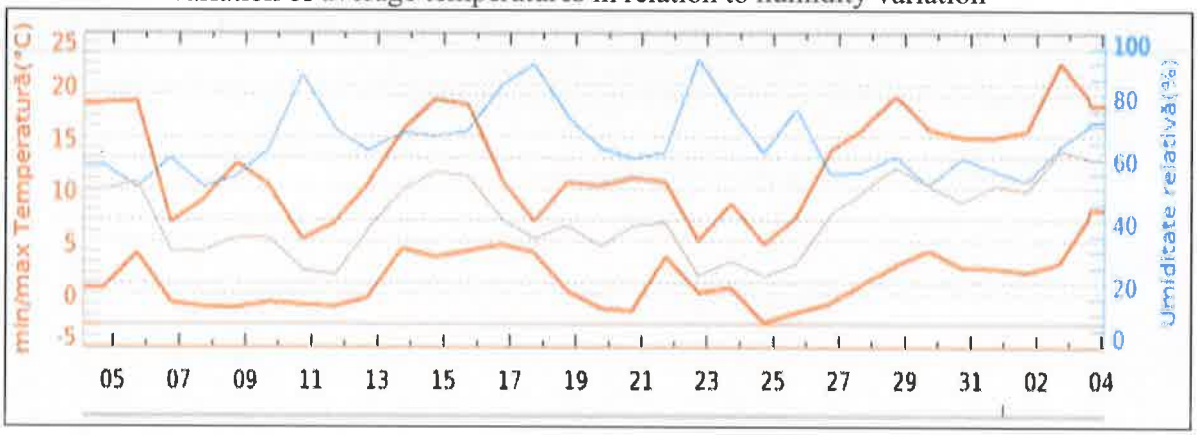


Figure 37 - Modelling of the variation of mean temperatures in relation to humidity variation for March 2022

Calculation of the concentrations of noxae in the flue gas, at emission, is presented centrally in the table below.

Table 59 - Calculated physical parameters for soft modelling input with additional air supply

item no.	Parameter	M.U.	Amount	Remarks
1	Excess air coefficient λ = ratio of the actual amount of air supplied for combustion to the minimum amount required, λ = Lr/Lmin.		1.7	
2	Theoretical dry air volume - Va	Nm^3/l	16.6	
3	Actual air volume	Nm^3/l	28.22	
4	Theoretical nitrogen volume $VN_2 = 0.79\ Va + N_2/100$	Nm^3/l	13.11	
5	Triatomic combustion gas volume $V_{RO2} = 0,01\ (CO_2 + CO + H_2S + sum.\ CmHn)$	Nm^3/l	1	
6	Theoretical dry gas volume $VgU = V_{N2} + V_{RO2}$	Nm^3/l	14.11	
7	Theoretical water vapor volume $V_{H2O} = 0,01\ (CO_2 + CO + H_2S + sum.\ CmHnn/2 + 0.124) + 0.0016\ \lambda$	Nm^3/l	1.98	
8	Theoretical flue gas volume Vg = VgU + VH2O		16.09	
9	Actual dry gas volume VgU = VgUo + (λ -1) Vao		25.73	
10	Actual water vapour volume $V_{H2O} = V_{H2O} + 0.016\ d\ (\lambda -1)\ Vao$		2.16	
11	Actual flue gas volume $Vg = VgU + V_{H2O}$		27.89	
12	Fuel consumption	l/h	122.5	
13	Gas temperature at stack outlet	oC	190	
14	Total gas flow Qg = VgB (273 + Tg)/273	m^3/s	1.389	5000 m3/h
15	Dispersion stack diameter D	m	0.5	
16	Dispersion stack height H	m	10	
17	Gas exhaust area Sg	m^2	0.196	
18	Exhaust gas velocity Wg = Qg/Sg	m/s	6.175	
19	Nox concentration (calculated)			
	NO_x	mg/m^3	0.05	
	CO	mg/m^3	0.004	
	Particles	mg/m^3	0.02	
	VOC	mg/m^3	-	
	SO_2	mg/m^3	-	
20	Amount of pollutant emitted			
	NO_x	g/s	0.00004	
	CO	g/s	0.0000036	
	Particles	g/s	0.000019	
	VOC	g/s	-	
	SO_2	g/s	-	
21	Average annual wind speed at the top of the chimney	m/s	6.95	
22	Average wind speed in the analyzed area	m/s	6.9	
23	Average annual stack height Dh = 1.5 x S x Wg/(Vo x D)	m	0.68	
24	Total flue gas lift height (annual average)	m	10.68	

Table 60 - Calculated physical parameters for soft modeling input without additional air supply

item no.	Parameter	M.U.	Amount	Remarks
1.	Excess air coefficient λ = ratio of the actual amount of air supplied for combustion to the minimum amount required, $\lambda = L_r / L_{min}$		1.7	
2.	Theoretical dry air volume -V_a	Nm^3/l	16.6	
3.	Actual air volume	Nm^3/l	28.22	
4.	Theoretical nitrogen volume $V_{N2} = 0.79\ V_a + N_2/100$	Nm^3/l	13.11	
5.	Triatomic combustion gas volume $V_{RO2} = 0{,}01\ (CO_2 + CO + H_2S + \text{sum. } C_mH_n)$	Nm^3/l	1	
6.	Theoretical dry gas volume $V_{gU} = V_{N2} + V_{RO2}$	Nm^3/l	14.11	
7.	Theoretical water vapor volume $V_{H2O} = 0{,}01\ (CO_2 + CO + H_2S + \text{sum. } C_mH_n n/2 + 0.124) + 0.0016\ \lambda$	Nm^3/l	1.98	
8.	Theoretical flue gas volume $V_g = V_{gU} + V_{H2O}$		16.09	
9.	Actual dry gas volume $V_{gU} = V_{gU}^{o} + (\lambda - 1)\ V_a^{o}$		25.73	
10.	Actual water vapour volume $V_{H2O} = V_{H2O} + 0{,}016\ d\ (\lambda - 1)\ V_a^{o}$		2.16	
11.	Actual flue gas volume $V_g = V_{gU} + V_{H2O}$		27.89	
12.	Fuel consumption	l/h	122.5	
13.	Gas temperature at stack outlet	°C	190	
14.	Total gas flow $Q_g = V_gB\ (273 + T_g)/273$	m^3/s	0.671	2416 m^3/h
15.	Dispersion stack diameter D	m	0.5	
16.	Dispersion stack height H	m	10	
17.	Gas outlet area S_g	m^2	0.785	
18.	Exhaust gas velocity $W_g = Q_g/S_g$	m/s	0.85	
19.	**Nox concentration (calculated)**			
	NO_x	mg/m^3	60	
	SO_2	mg/m^3	2.4	
	CO	mg/m^3	78.3	
	PST	mg/m^3	1.2	
	HCl	mg/m^3	5.38	
	HF	mg/m^3	0.04	
	COT	mg/m^3	4.6	
20.	**Amount of pollutant emitted**			
	NO_x	mg/s	40	
	SO_2	mg/s	1.6	
	CO	mg/s	52.19	
	PST	mg/s	0.8	
	HCl	mg/s	3.61	
	HF	mg/s	0.0269	
	COT	mg/s	3.086	
21.	Average annual wind speed at the top of the chimney	m/s	6.95	
22.	Average wind speed in the analyzed area	m/s	6.9	
23.	Average annual stack height $D_h = 1.5 \times S \times W_g/(V_o \times D)$	m	0.68	
24.	Total flue gas lift height (annual average)	m	10.68	

At the same time, the dispersion of pollutants in the atmosphere was modeled for the following situations:

1. perform mathematical modeling for short, medium and long averaging periods for pollutants:
   - NO_x
   - SO_2
   - CO
   - TSP

- HCl
- HF
- COT
- dioxins and furans

Mathematical modeling was also carried out for the pollutants dioxins and furans for a resulting emission concentration for an averaging period of 6-8 hours.

For the estimation of dioxin and furan concentrations in immission (values that can affect human health), emission values for waste incineration activity in incinerators with secondary combustion chamber (and even more so with auxiliary filter systems) must first be estimated. Several international studies have been reviewed in this regard. Among these, we mention:

- Measurement of Dioxin Emissions from a Small-Scale Waste Incinerator în the Absence of Air Pollution Controls[38]
- Incineration and Dioxins Review of Formation Processes[39]
- Hazardous Waste Incineration Measurement Guidance Manual: Volume 3 of the Hazardous Waste Incineration Series[40]

According to these and many other studies, the maximum concentration of dioxins and furans at the flue gas outlet of modern incinerators equipped with a secondary combustion chamber (and even more so of those with additional filter systems) is a maximum of 0.042 ng I.TEQ/Nmc. This will be the value for which the mathematical modelling will be carried out although this value is well below the limit value of 0.1 ng I.TEQ/Nmc.

2. single source of pollution (incinerator flue gas stack) - 1 source with constant hourly pollutant flow rate
3. use of meteorological data for one calendar year (data for 2020 recorded at Giurgiu weather station were used)
4. modeling for mediation duration 30 min
5. modeling for mediation duration 1 h
6. modeling for mediation duration 8 h
7. modeling for mediation duration 24 h
8. modeling for mediation duration 1 year

The results of this modeling are presented below:

Location of emission source:

Table 61 - Stationary emission source coordinates

Incinerator	Source coordinates	
IE 1000R-300	43°53'11.10"N	25°55'56.78"E

[38] Int J Environ Res Public Health. 2019 Apr; 16(7): 1267.
[39] A consultancy funded by Environment Australia Department of the Environment and Heritage
[40] U.S. Environmental Protection Agency

Figure 38 - Location of stationary emission sources

Figure 39 - Incinerator location

NO_x - averaging period 1h, 24 h and 1 year

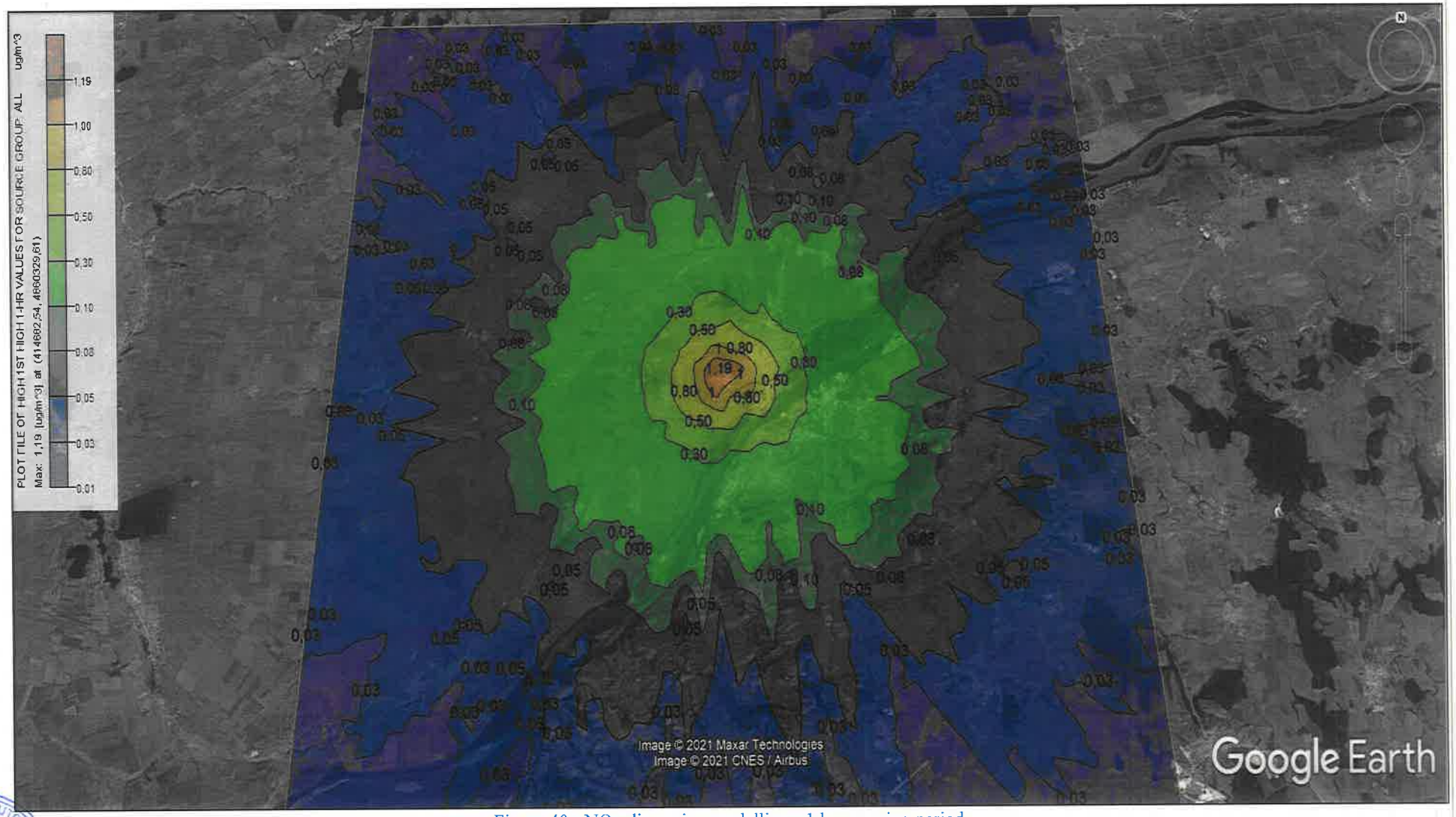


Figure 40 - NOx dispersion modelling - 1 h averaging period

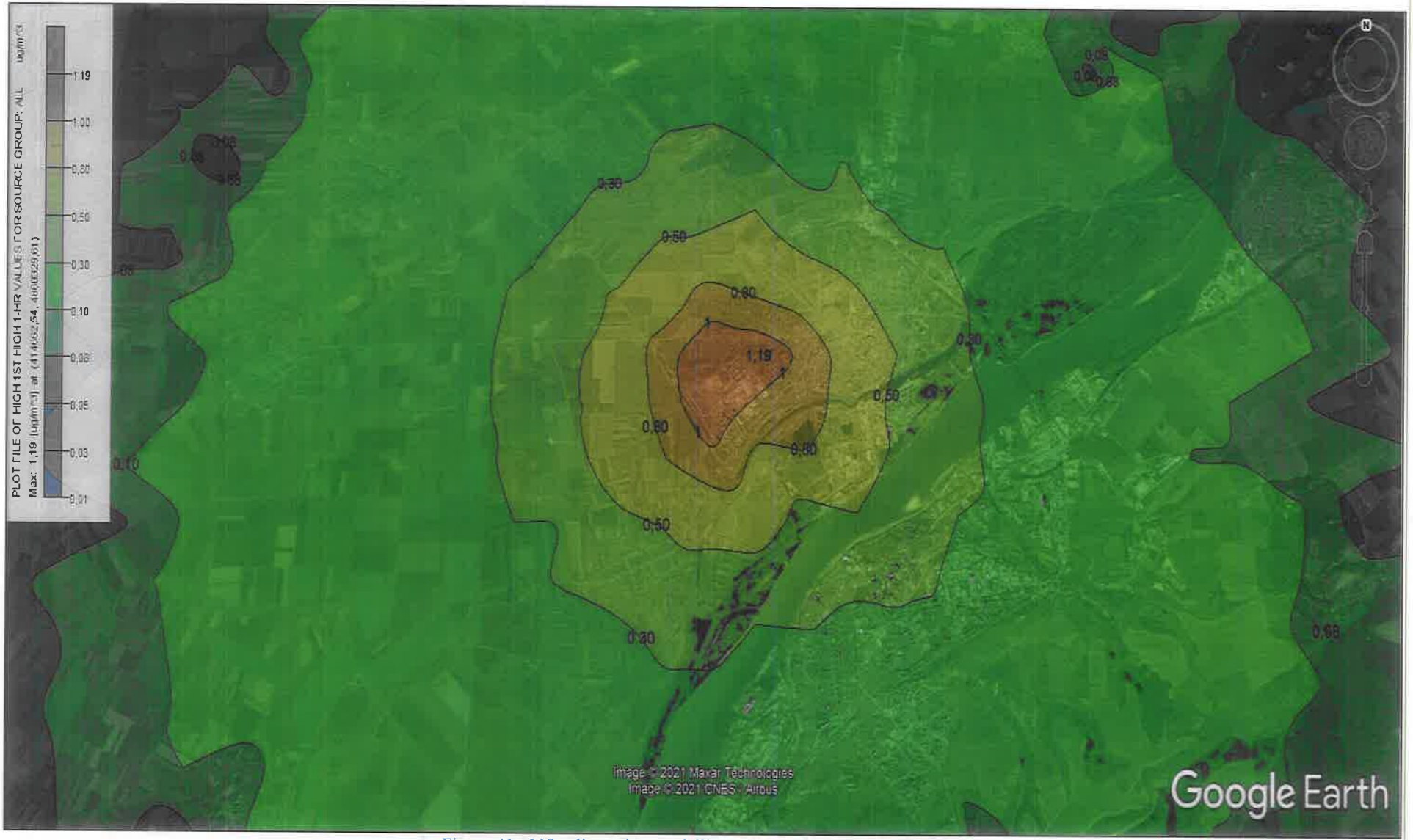


Figure 41 - NOx dispersion modelling - 1 h averaging period (detail)

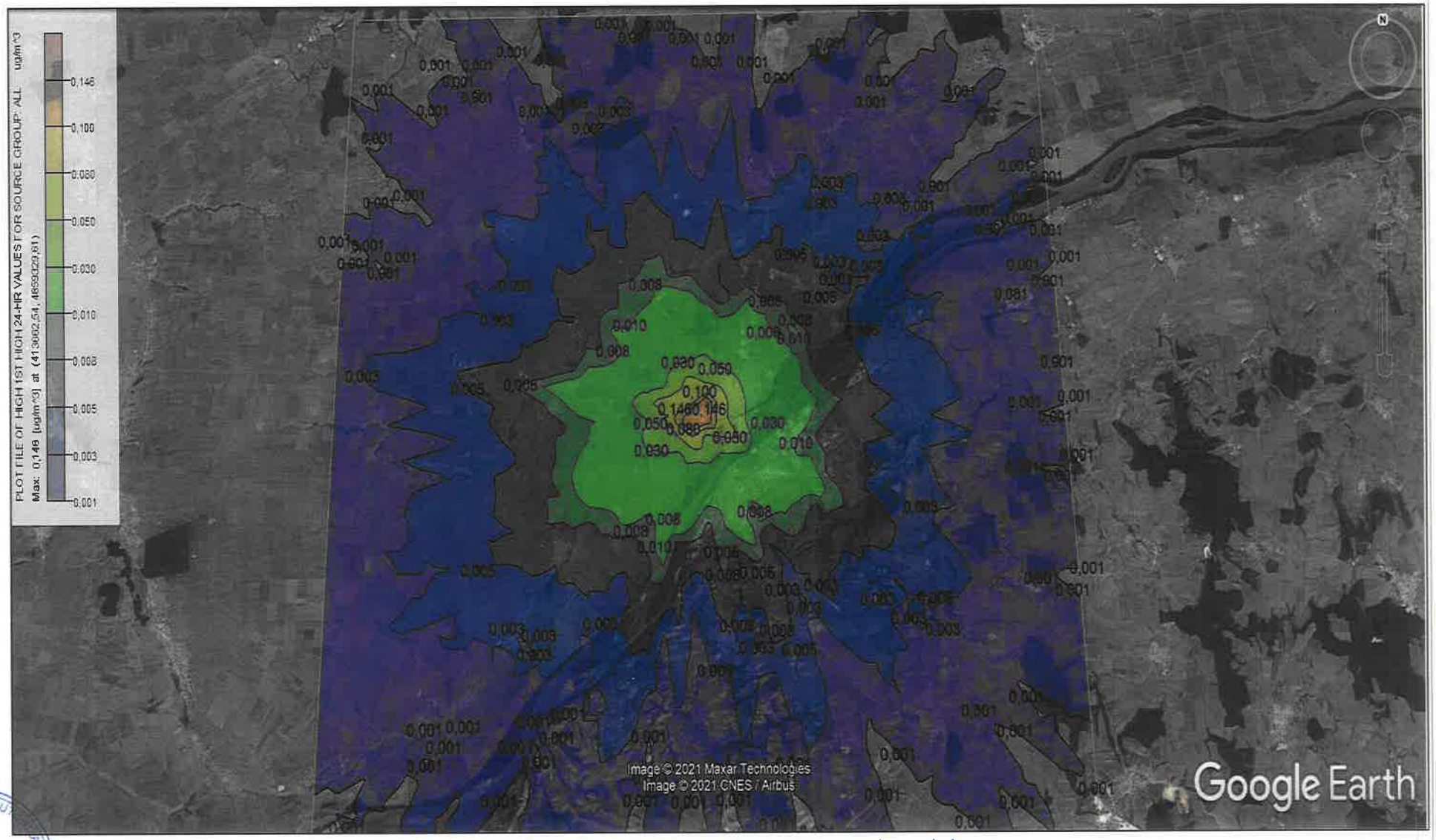


Figure 42 - NOx dispersion modelling - 24 h averaging period

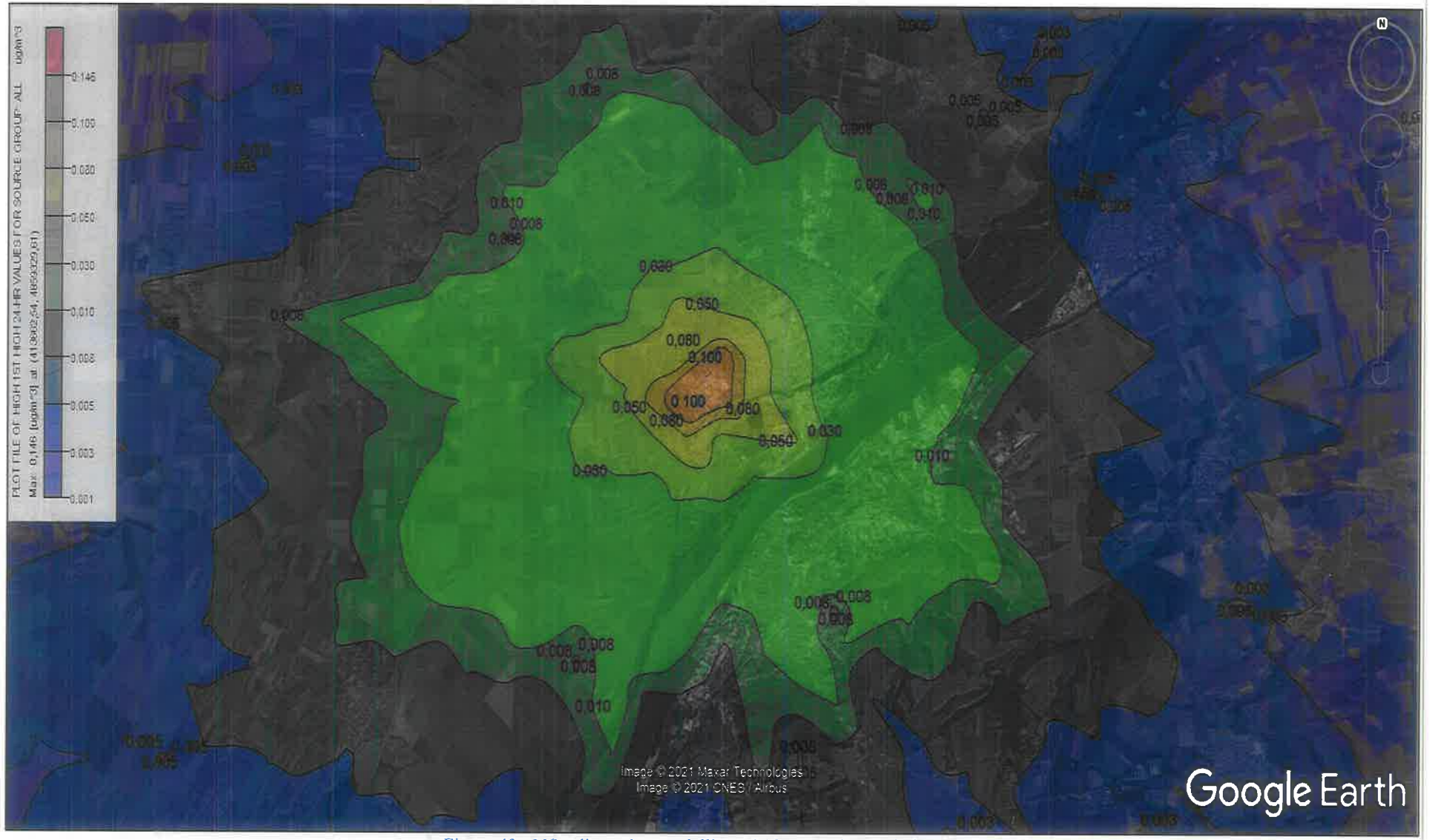


Figure 43 - NOx dispersion modelling - 24 h averaging period (detail)

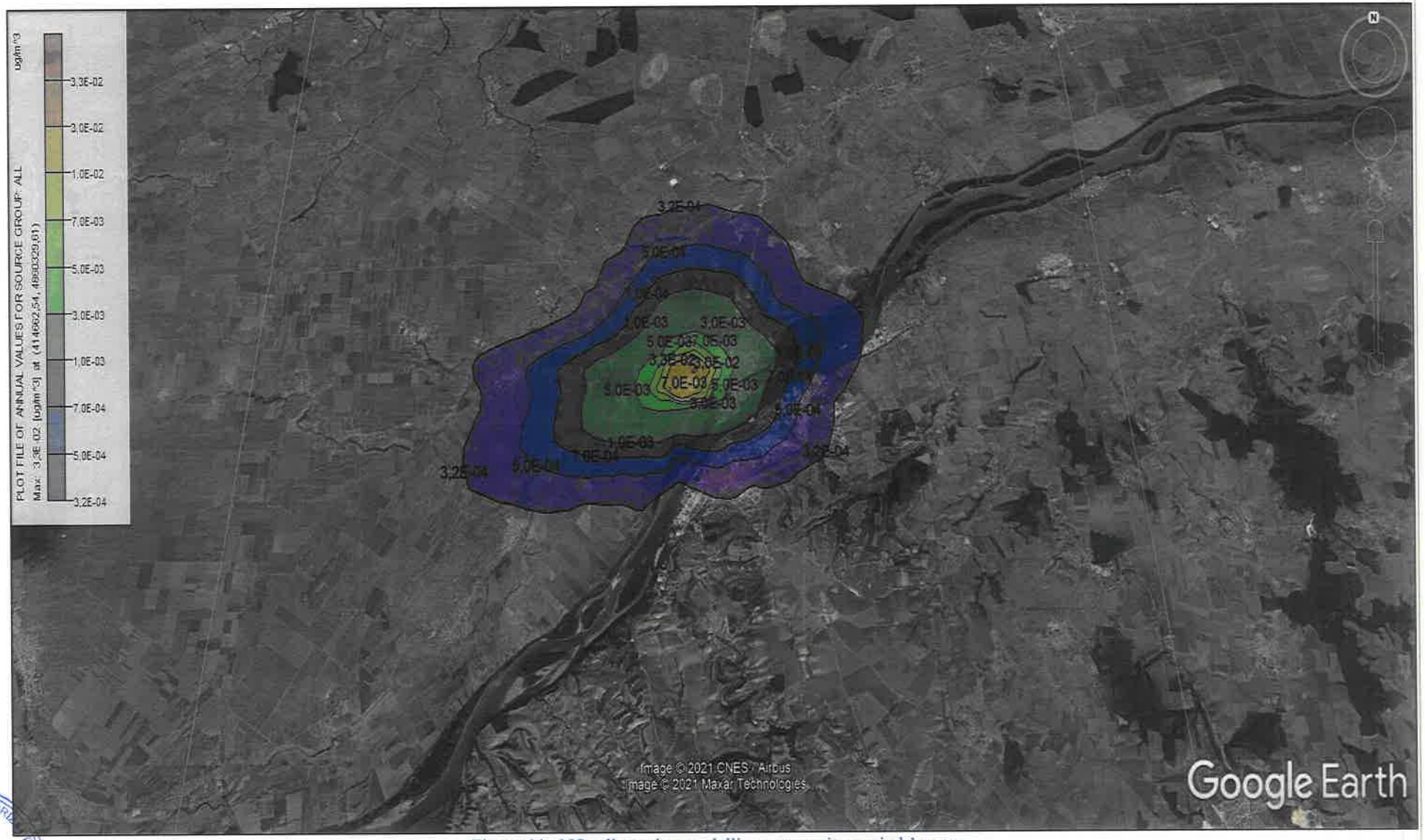


Figure 44 - NOx dispersion modelling - averaging period 1 year

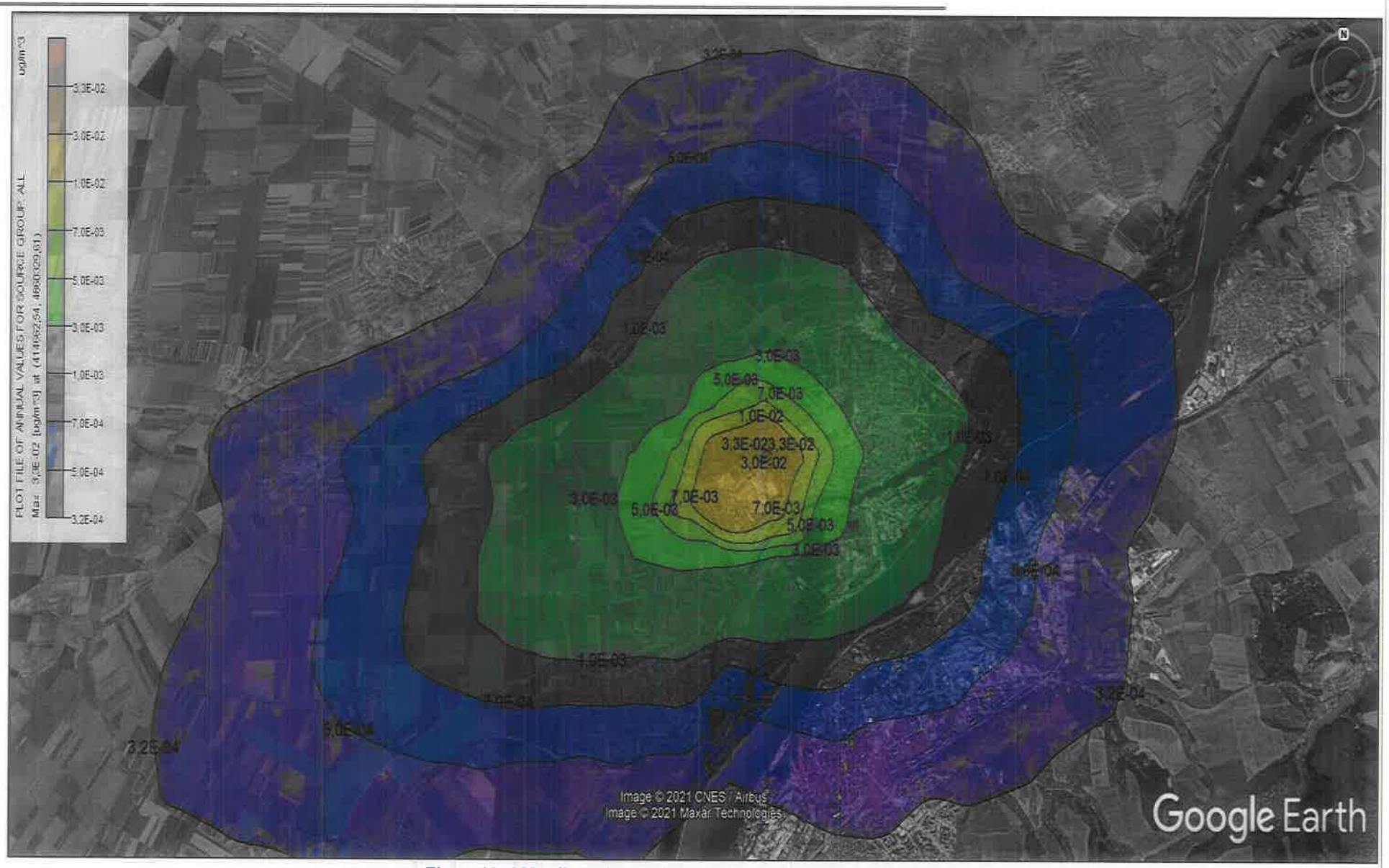


Figure 45 - NOx dispersion modelling - averaging period 1 year (detail)

CO - - averaging period 8 h, 24 h and 1 year

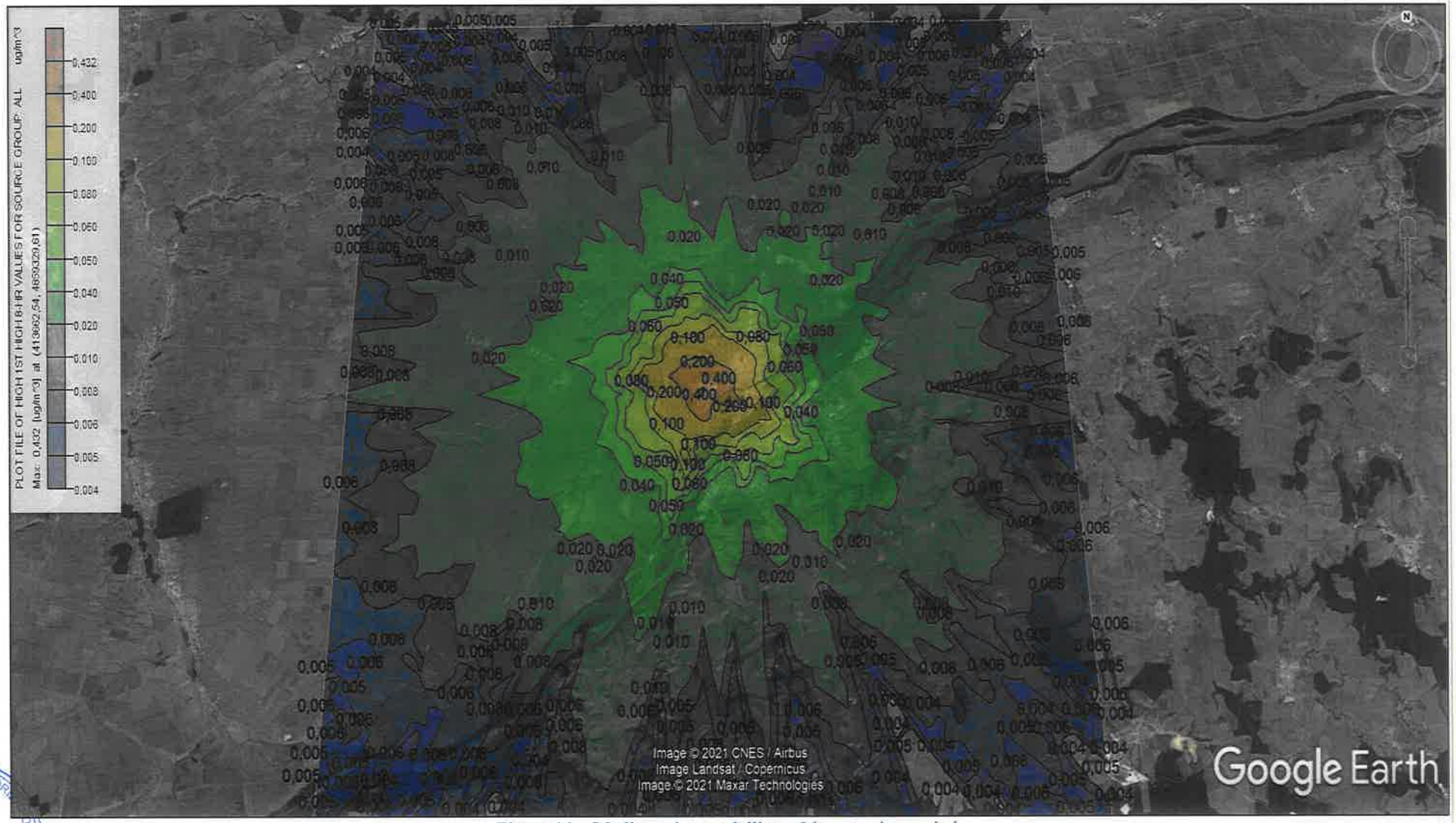


Figure 46 - CO dispersion modelling - 8 h averaging period

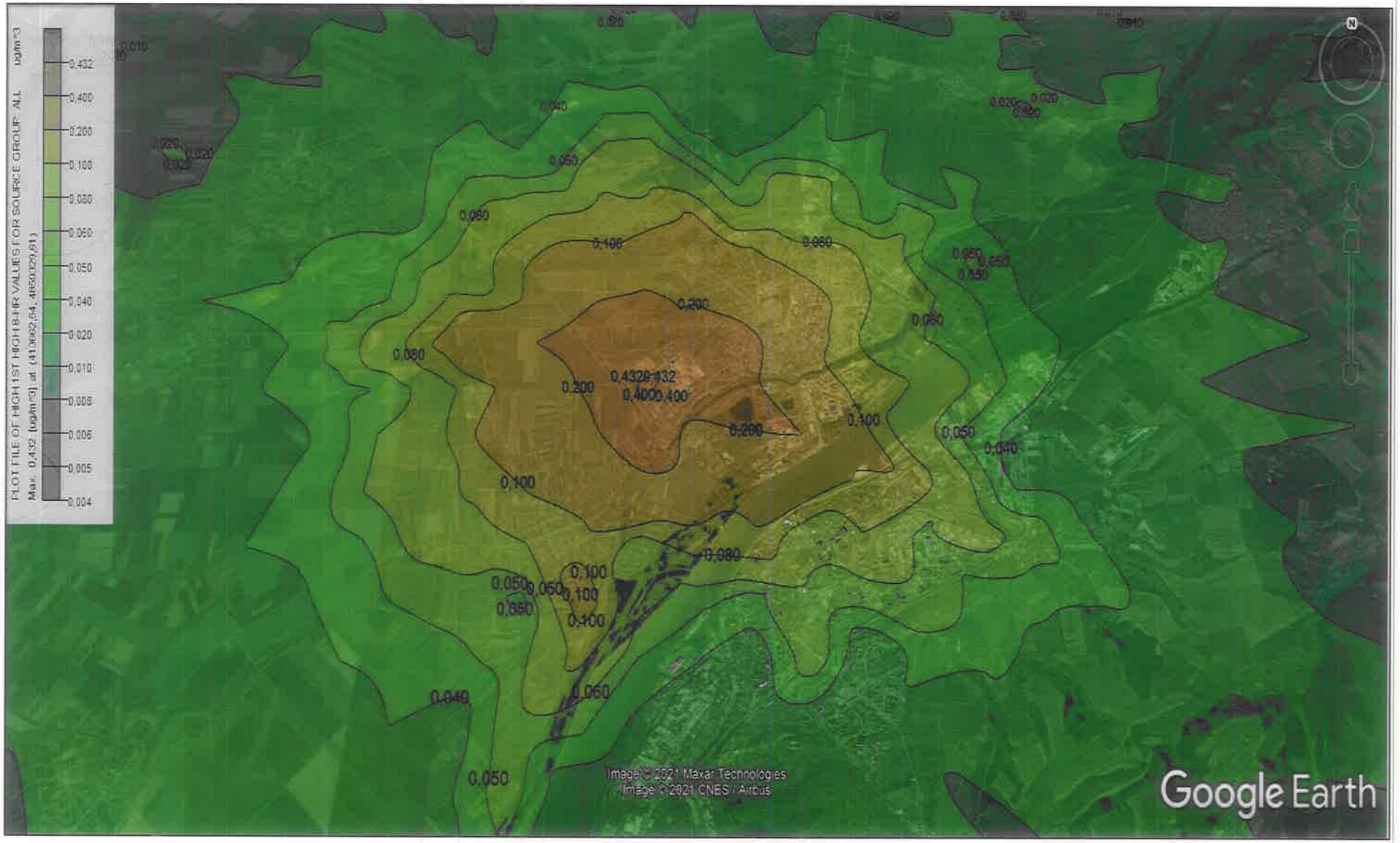


Figure 47 - CO dispersion modelling - 8 h averaging period (detail)

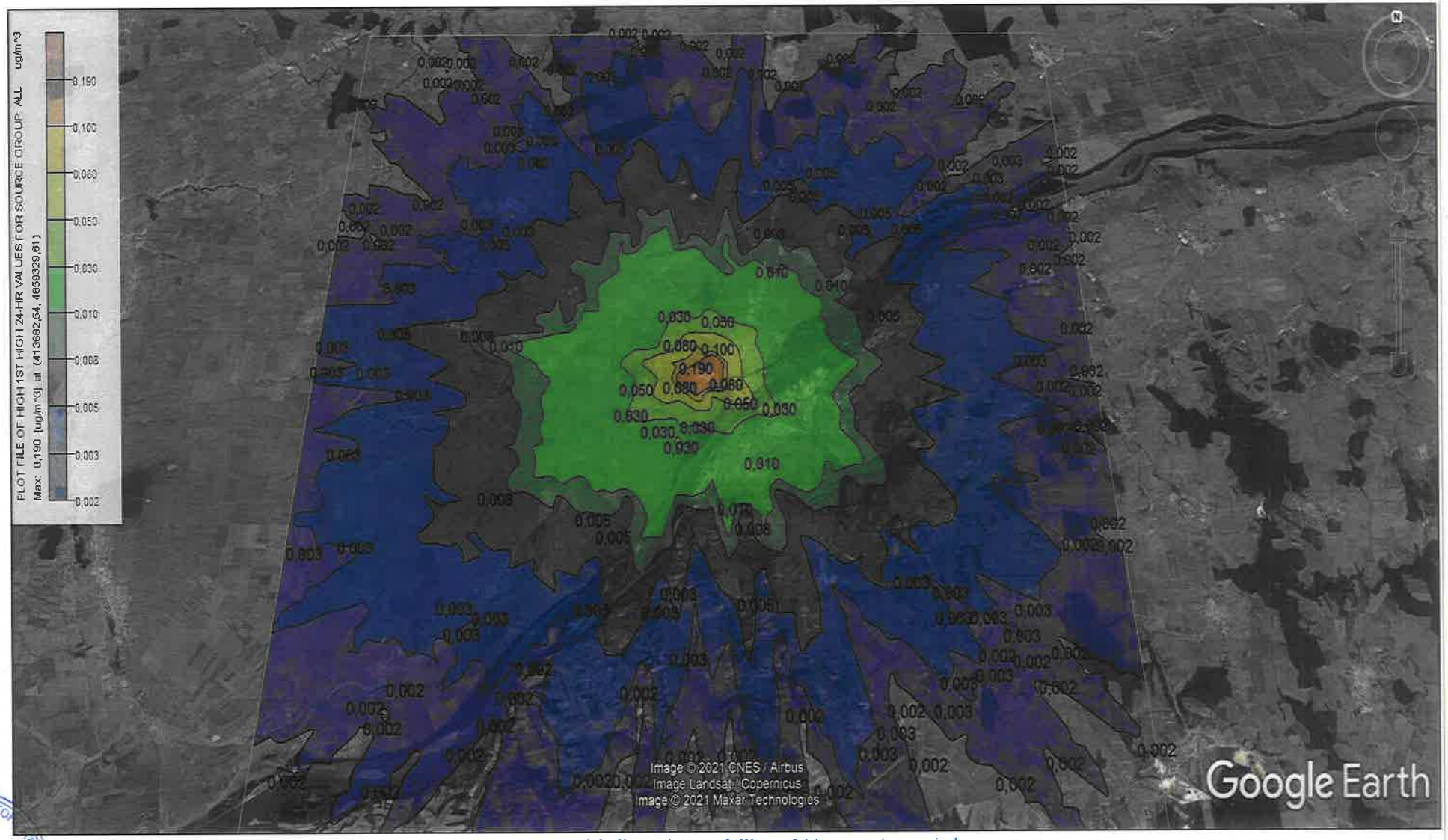


Figure 48 - CO dispersion modelling - 24 h averaging period

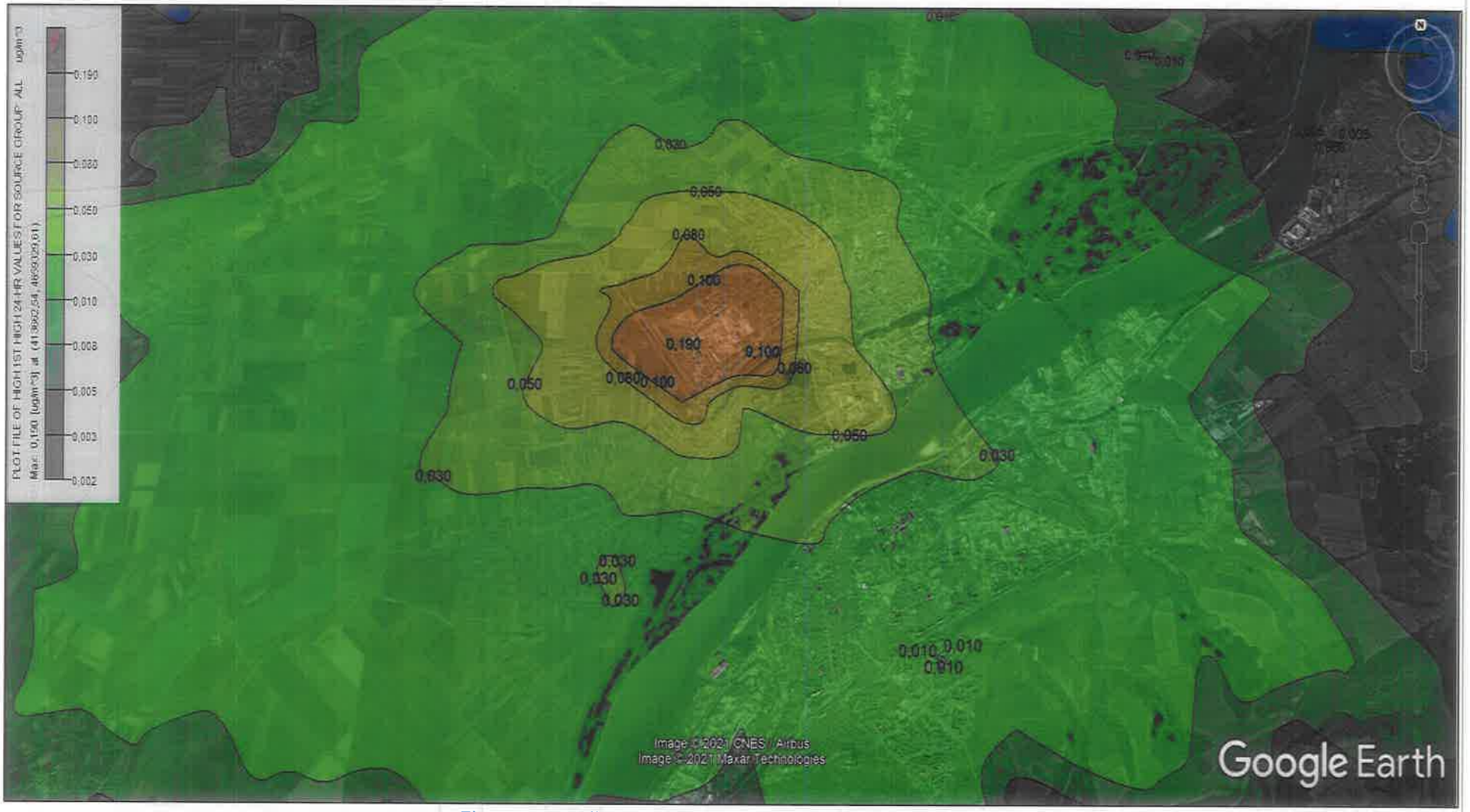


Figure 49 - CO dispersion modelling - 24 h averaging period (detail)

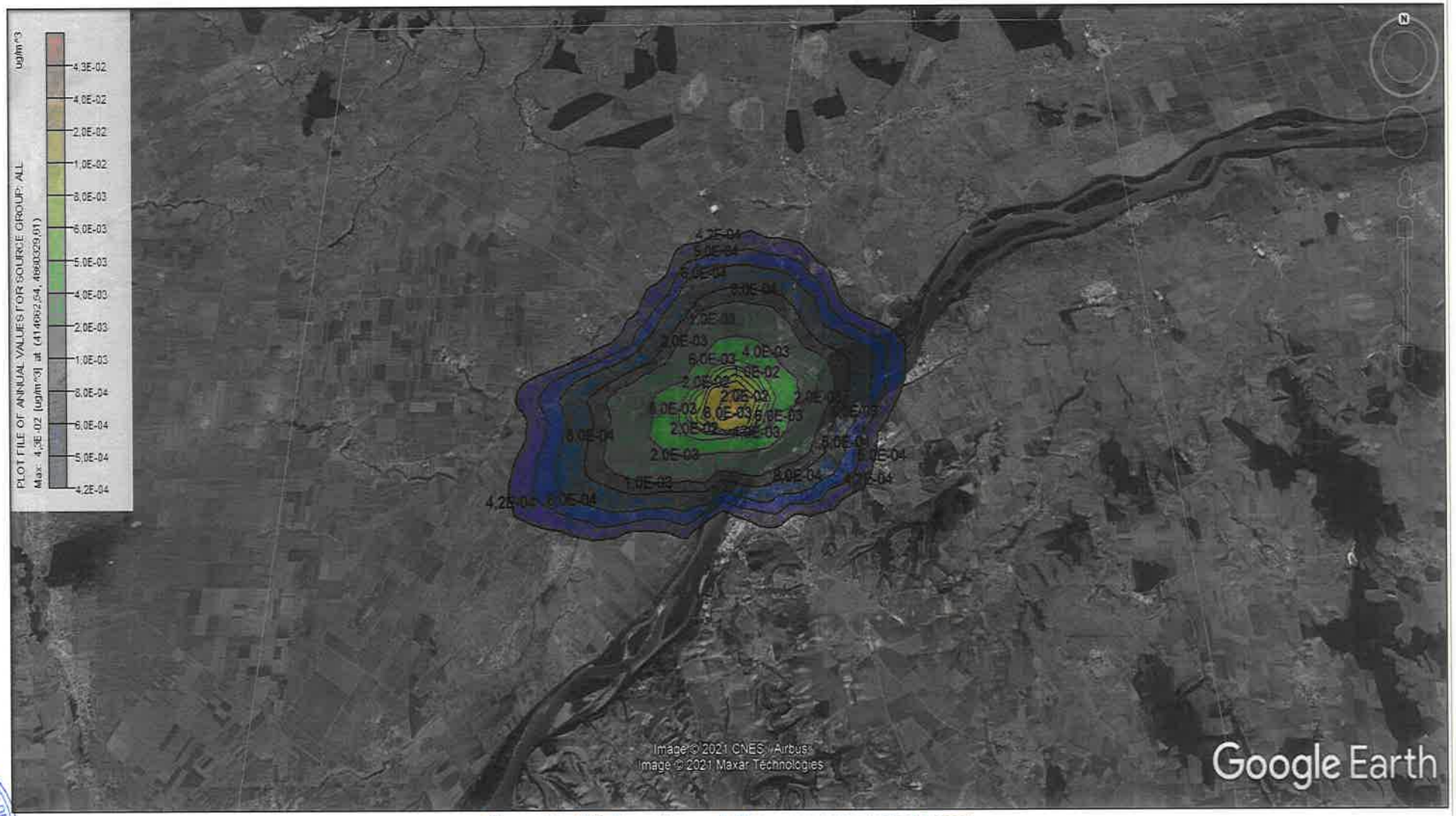


Figure 50 - CO dispersion modelling - averaging period 1 year

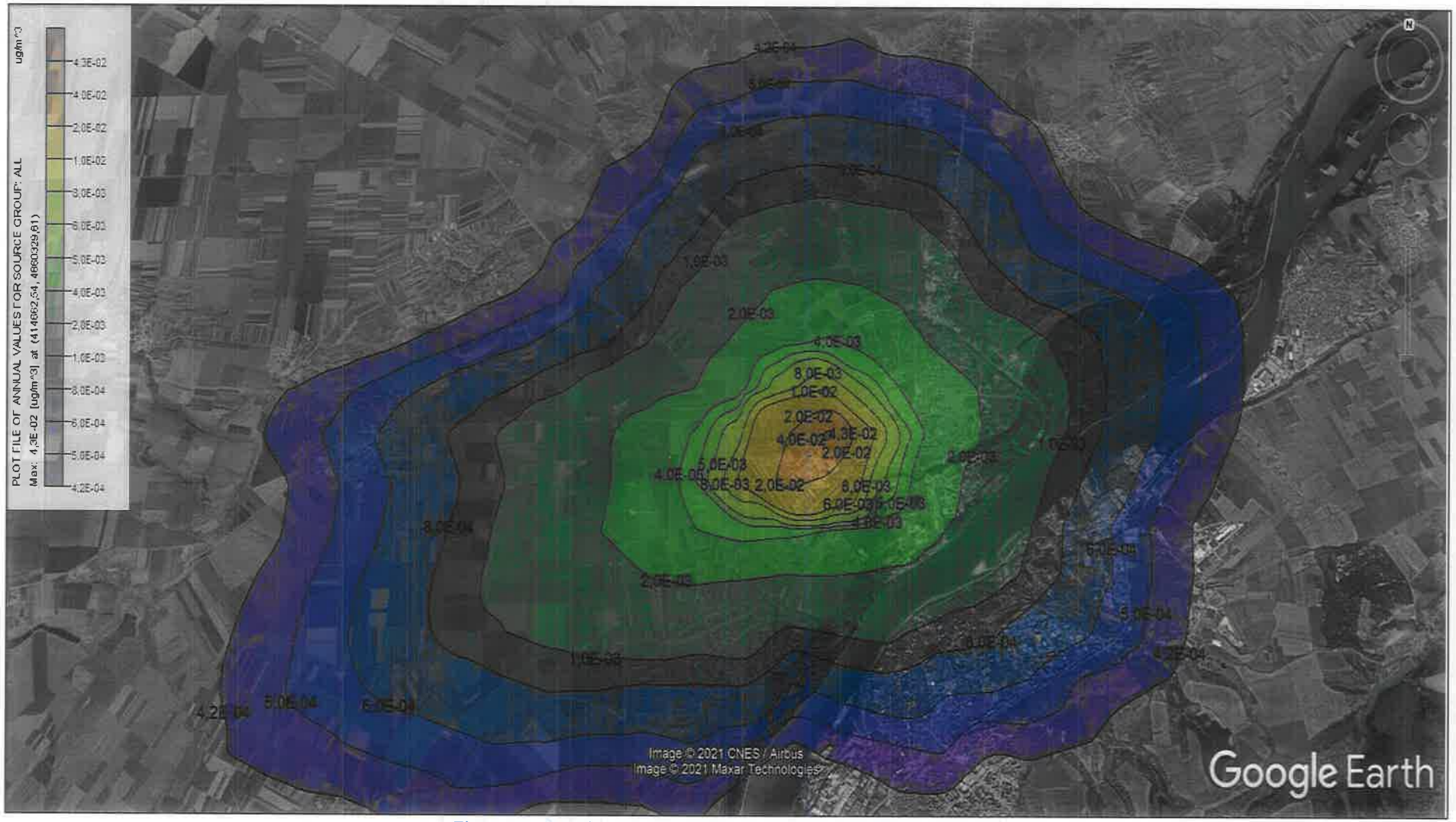


Figure 51 - CO dispersion modelling - averaging period 1 year (detail)

TSP - - averaging period 1h, 24 h and 1 year

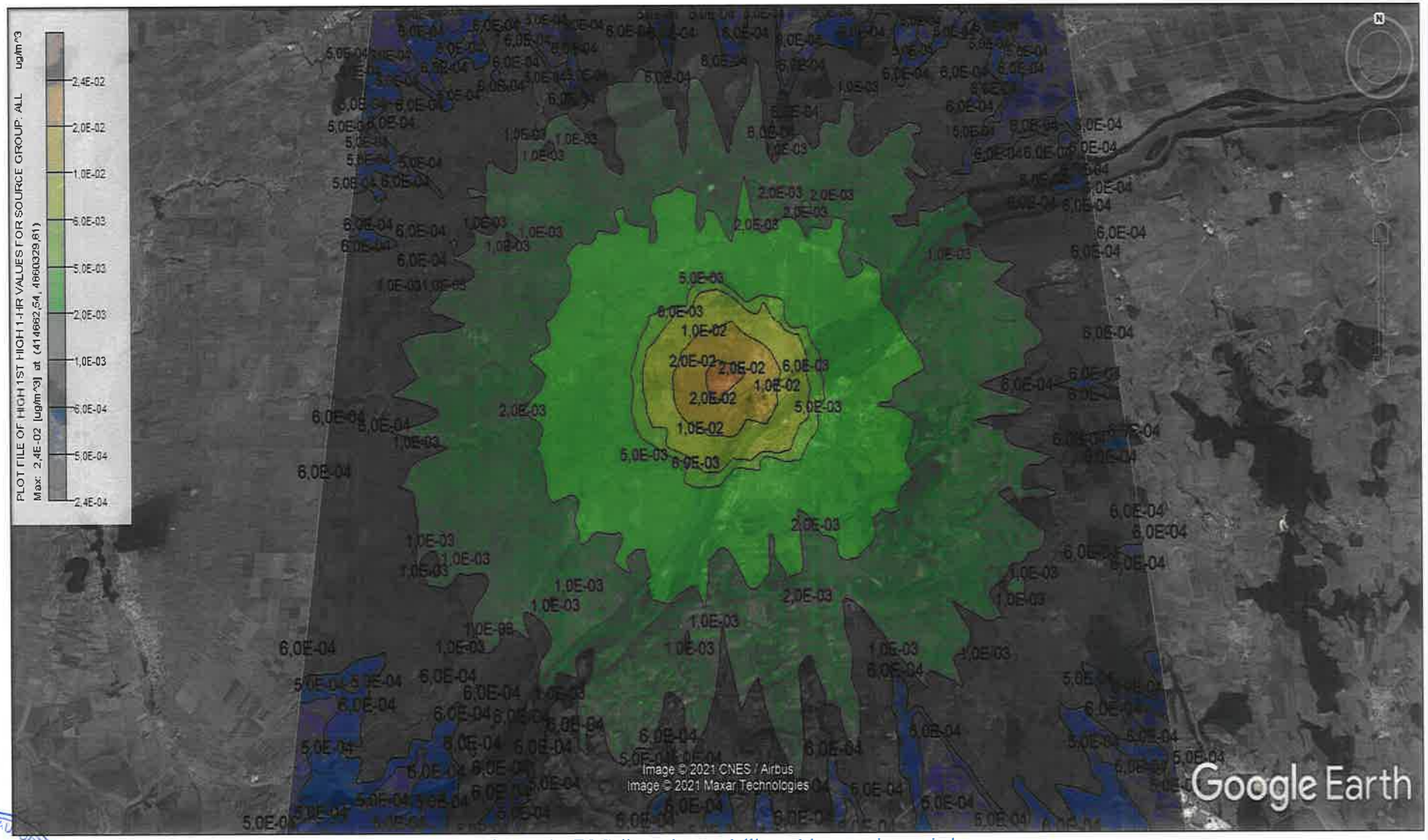


Figure 52 - TOC dispersion modelling - 1 h averaging period

Figure 53 - TSP dispersion modelling - averaging period 1 h (detail)

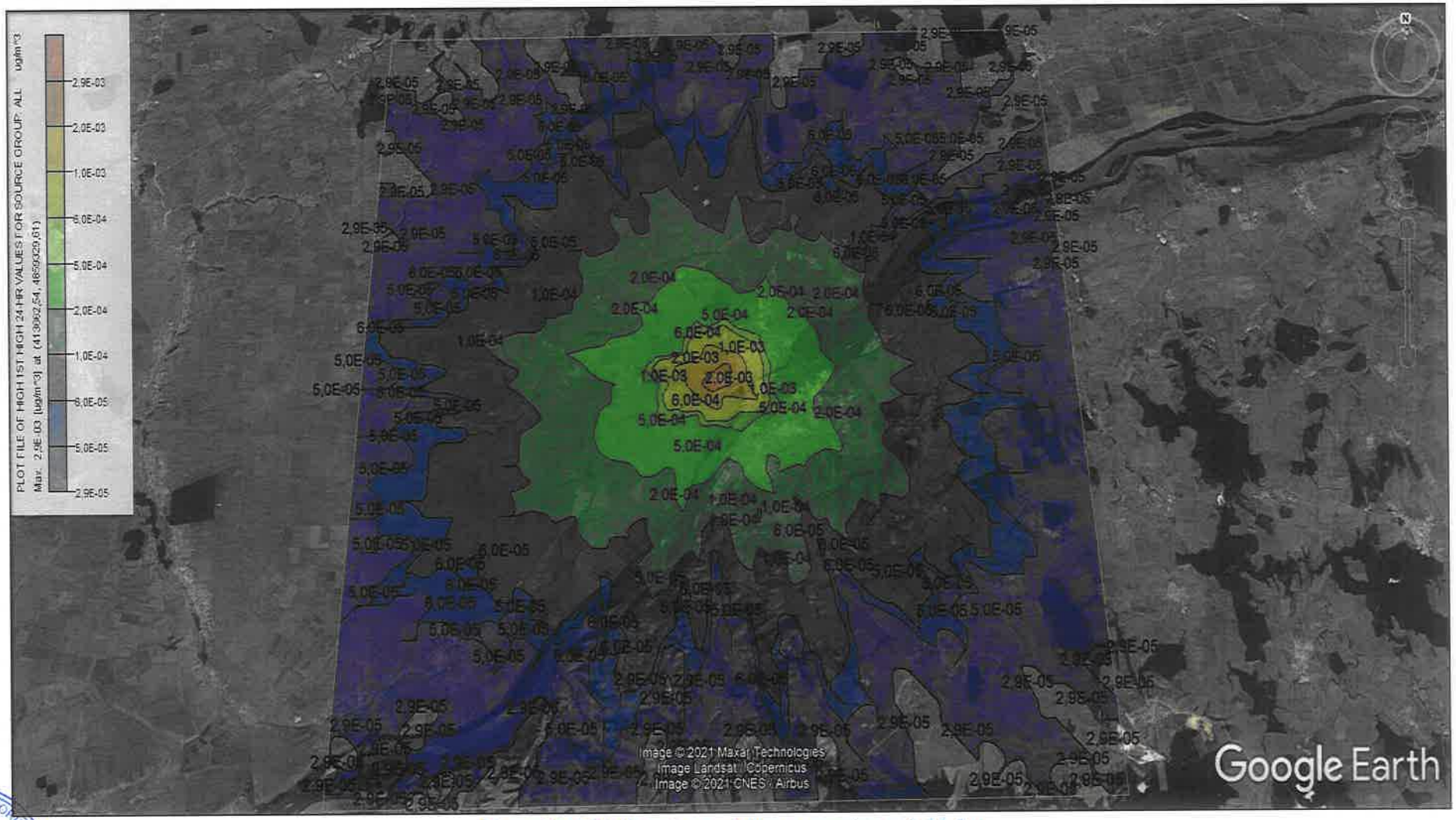


Figure 54 - TSP dispersion modelling - averaging period 1 day

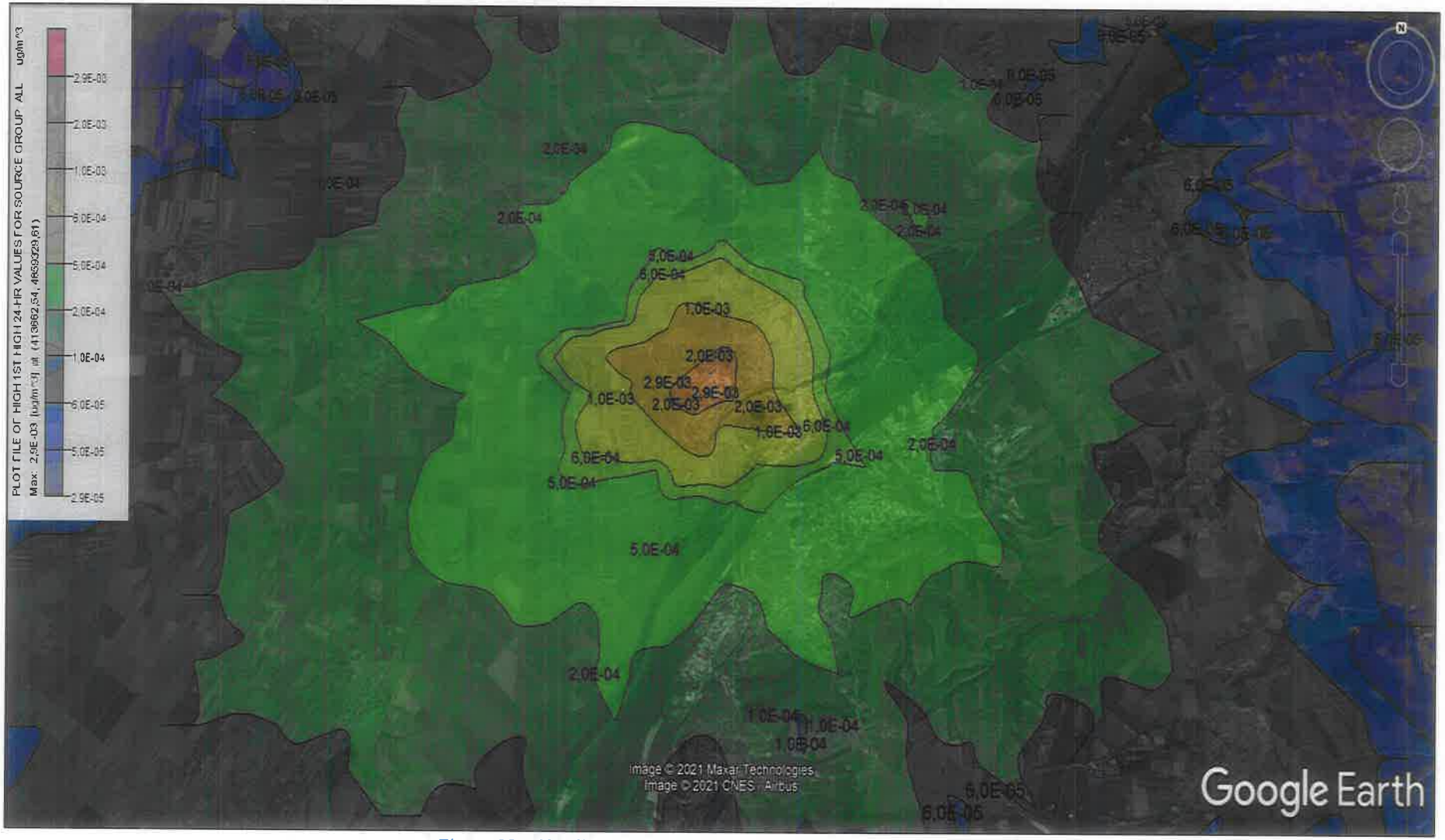


Figure 55 - TSP dispersion modelling - averaging period 1 day (detail)

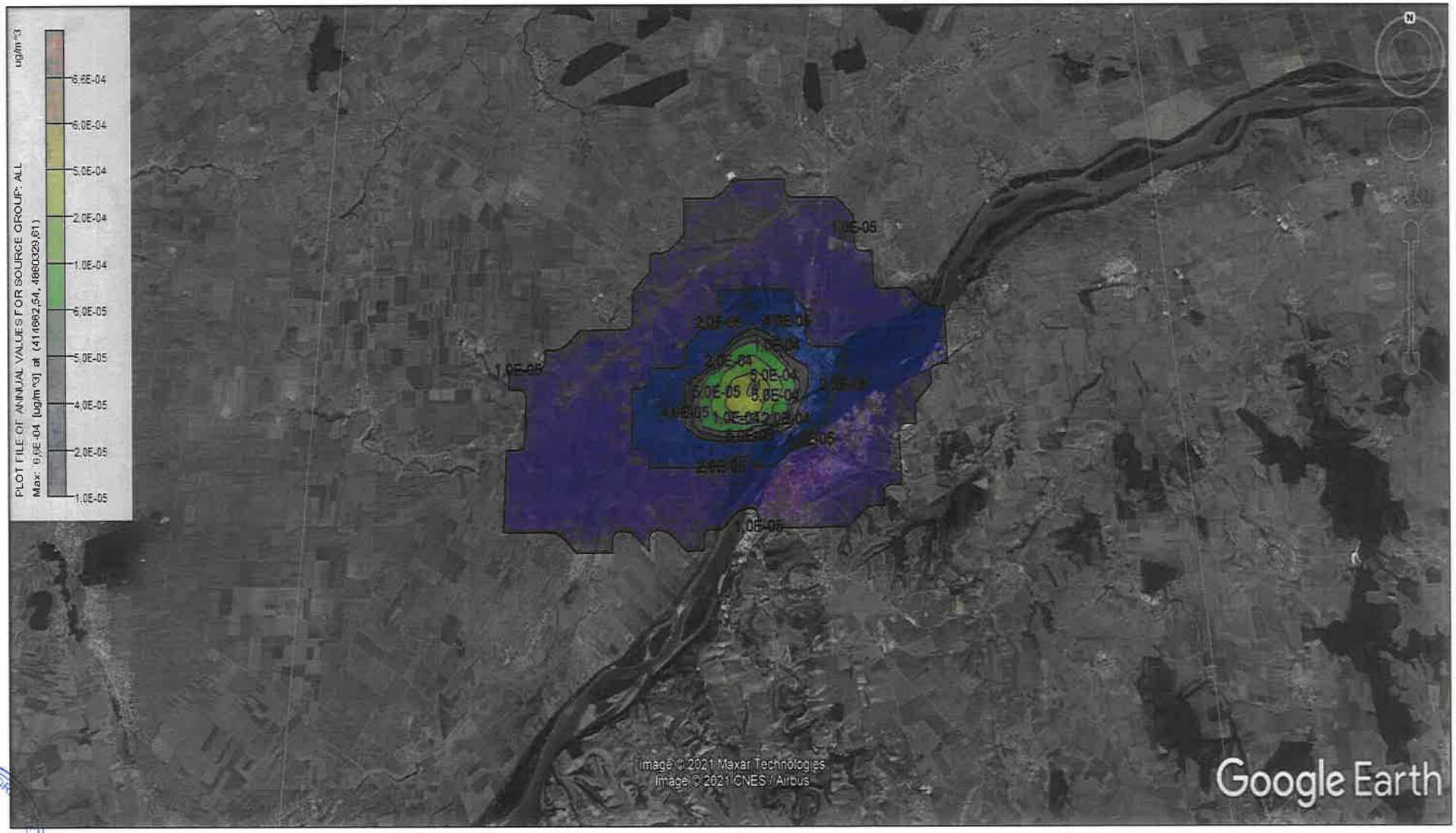


Figure 56 - TSP dispersion modelling - averaging period 1 year

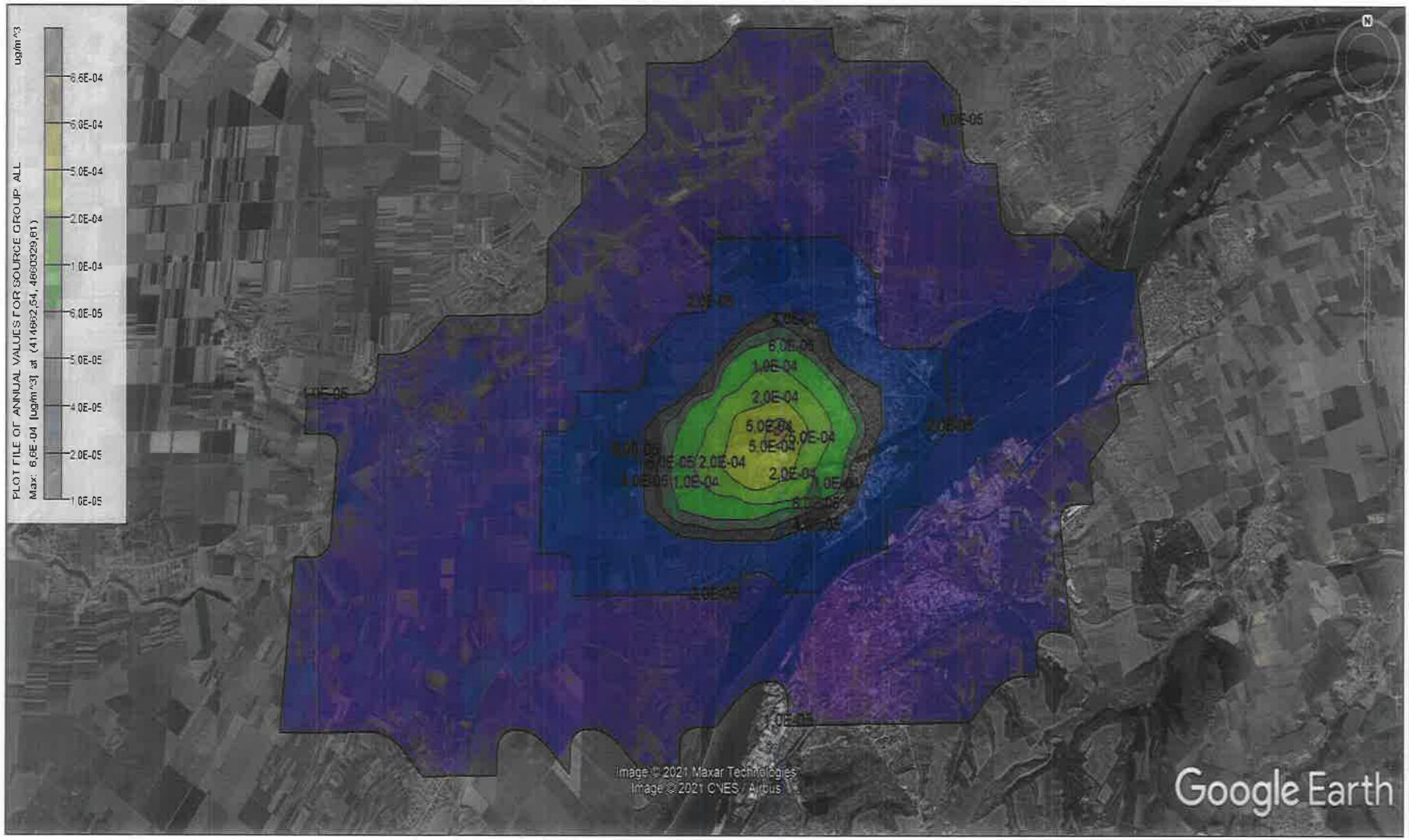


Figure 57 - TSP dispersion modelling - averaging period 1 year (detail)

SO_2 - – averaging period 1h, 24 h and 1 year

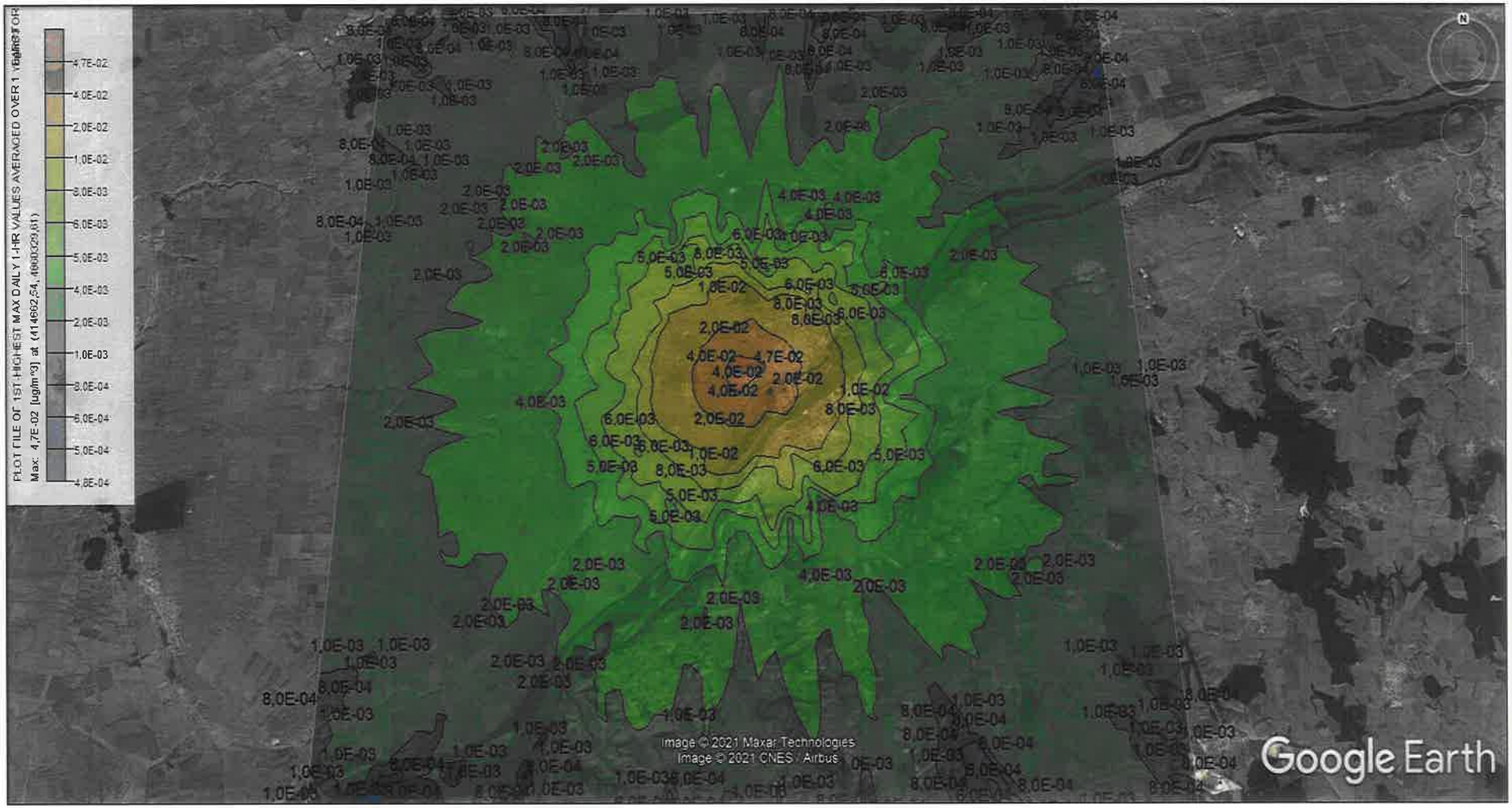


Figure 58 - SO2 dispersion modelling - 1h averaging period

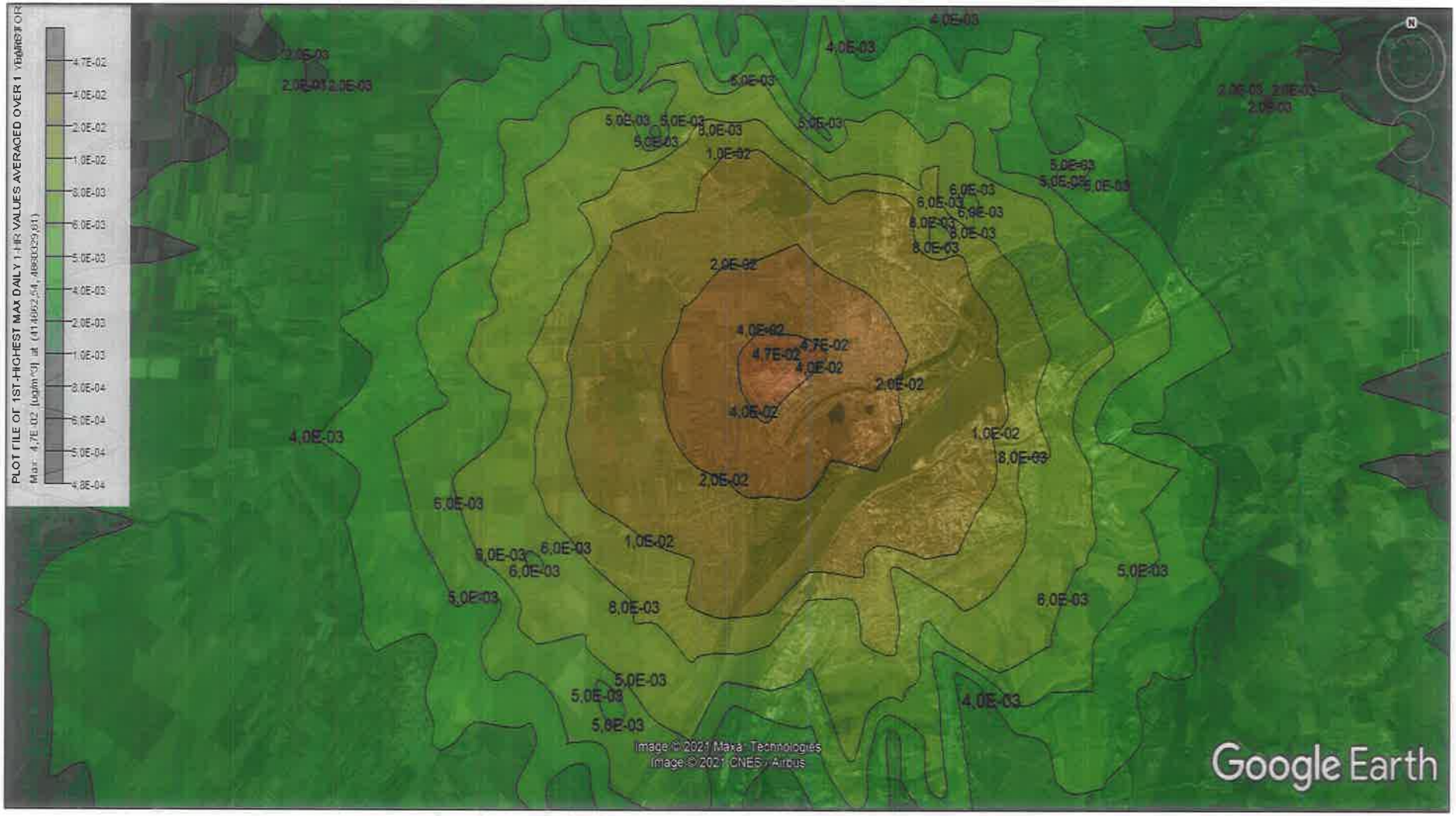


Figure 59 - SO2 dispersion modelling - averaging period 1 h (detail)

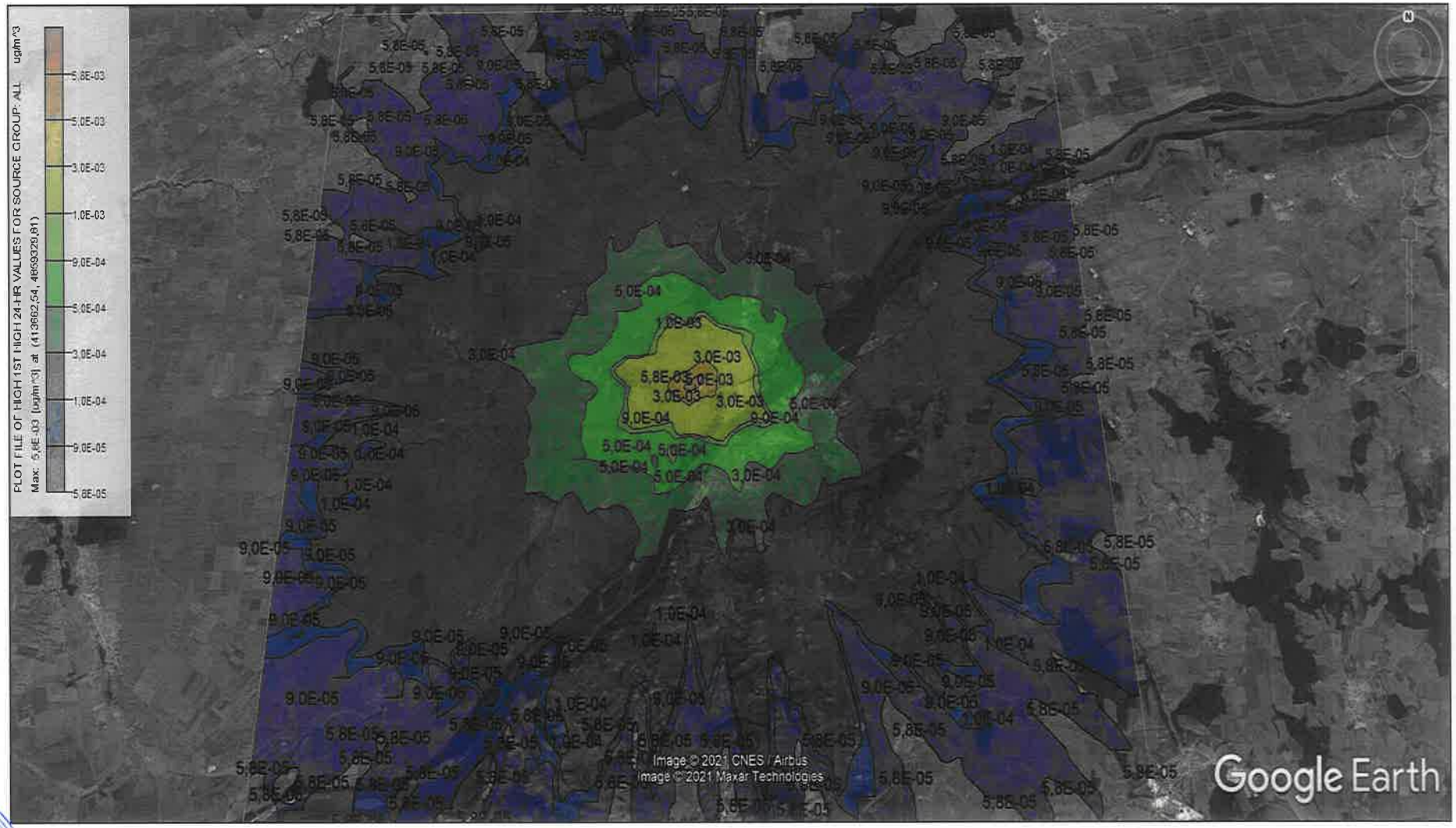


Figure 60 - SO2 dispersion modelling - 24 h averaging period

Figure 61 - SO2 dispersion modelling - 24 h averaging period (detail)

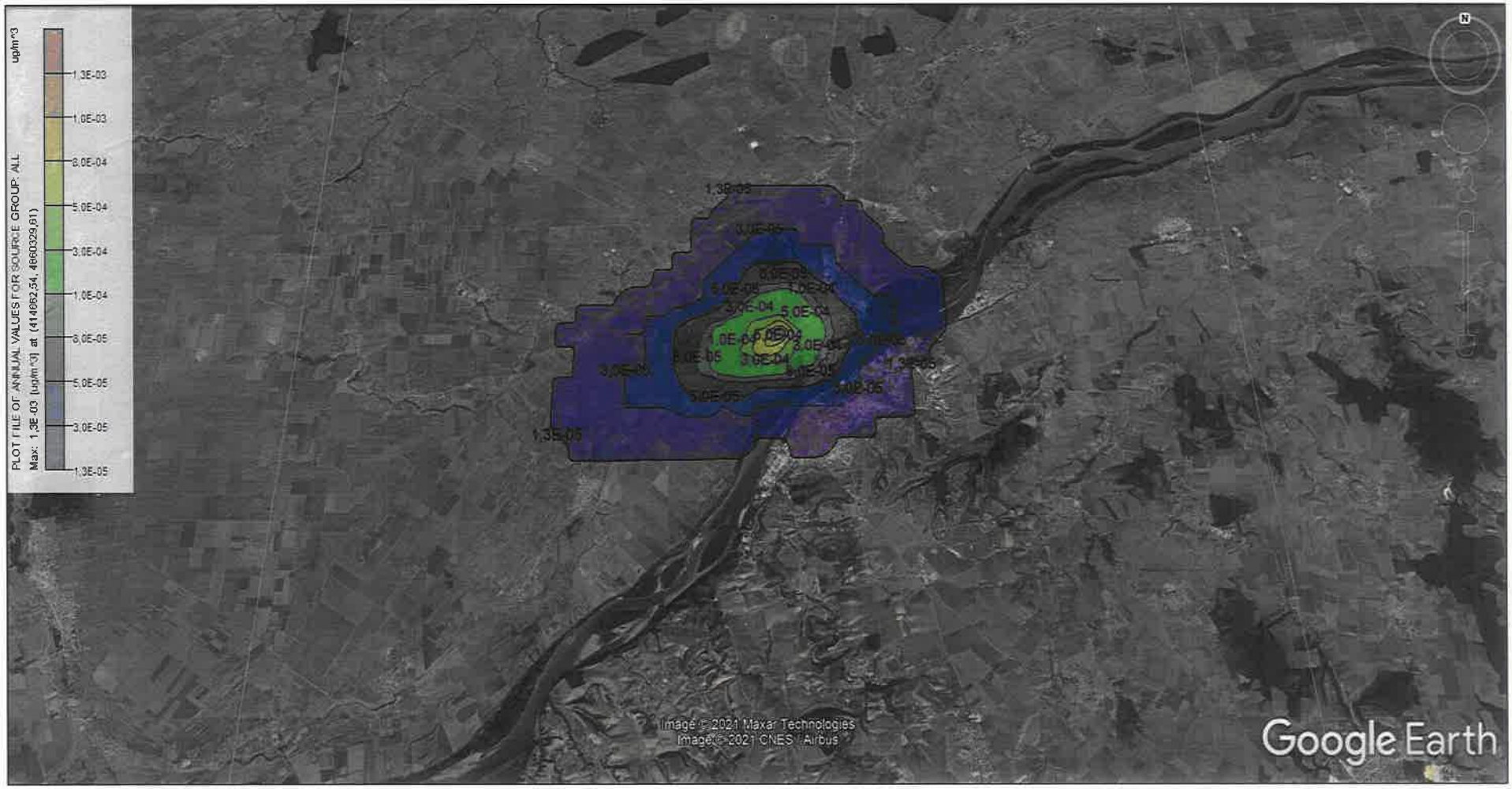


Figure 62 - SO2 dispersion modelling - averaging period 1 year

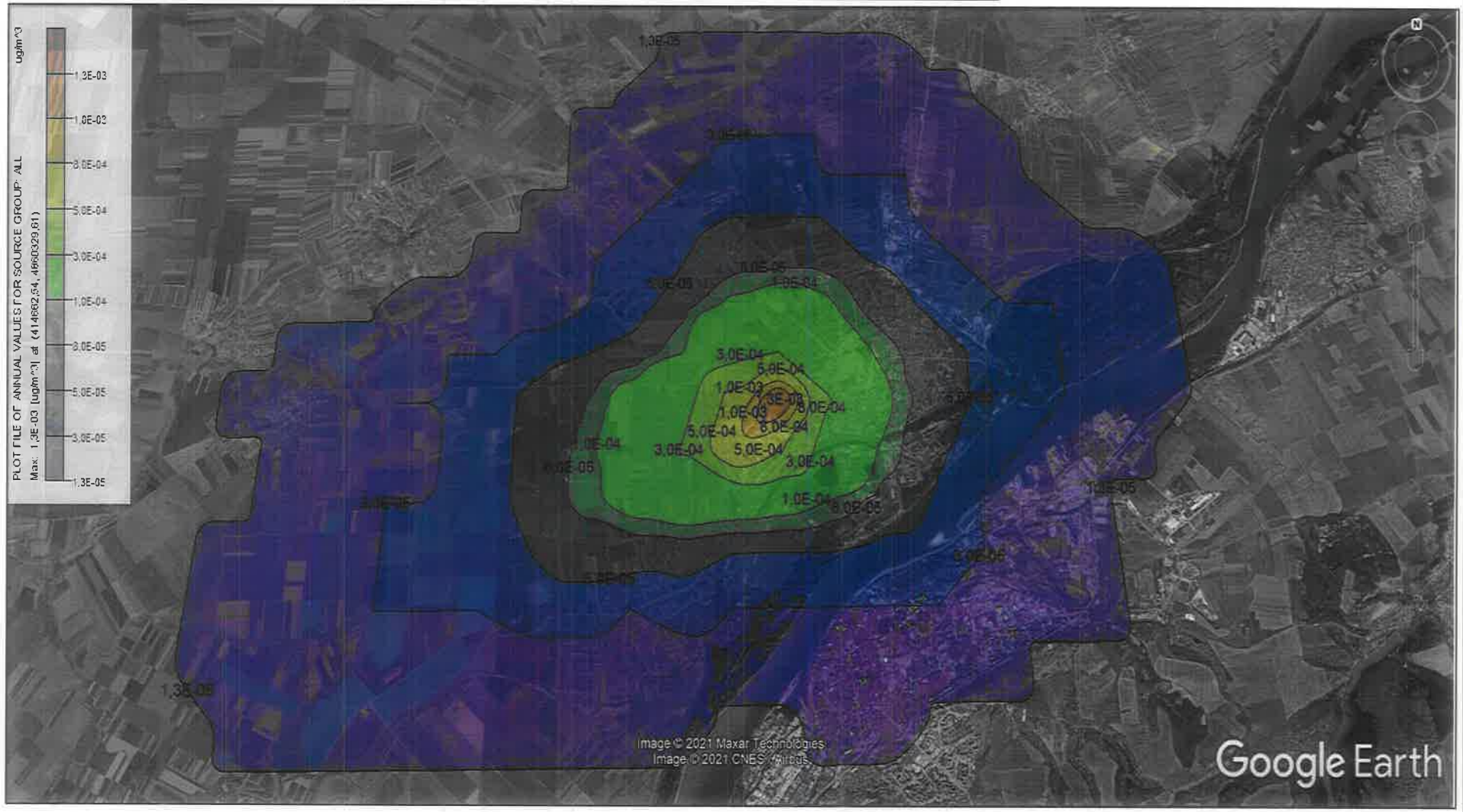


Figure 63 - SO2 dispersion modelling - averaging period 1 year (detail)

HCl - – averaging period 30 minutes, 24 h and 1 year

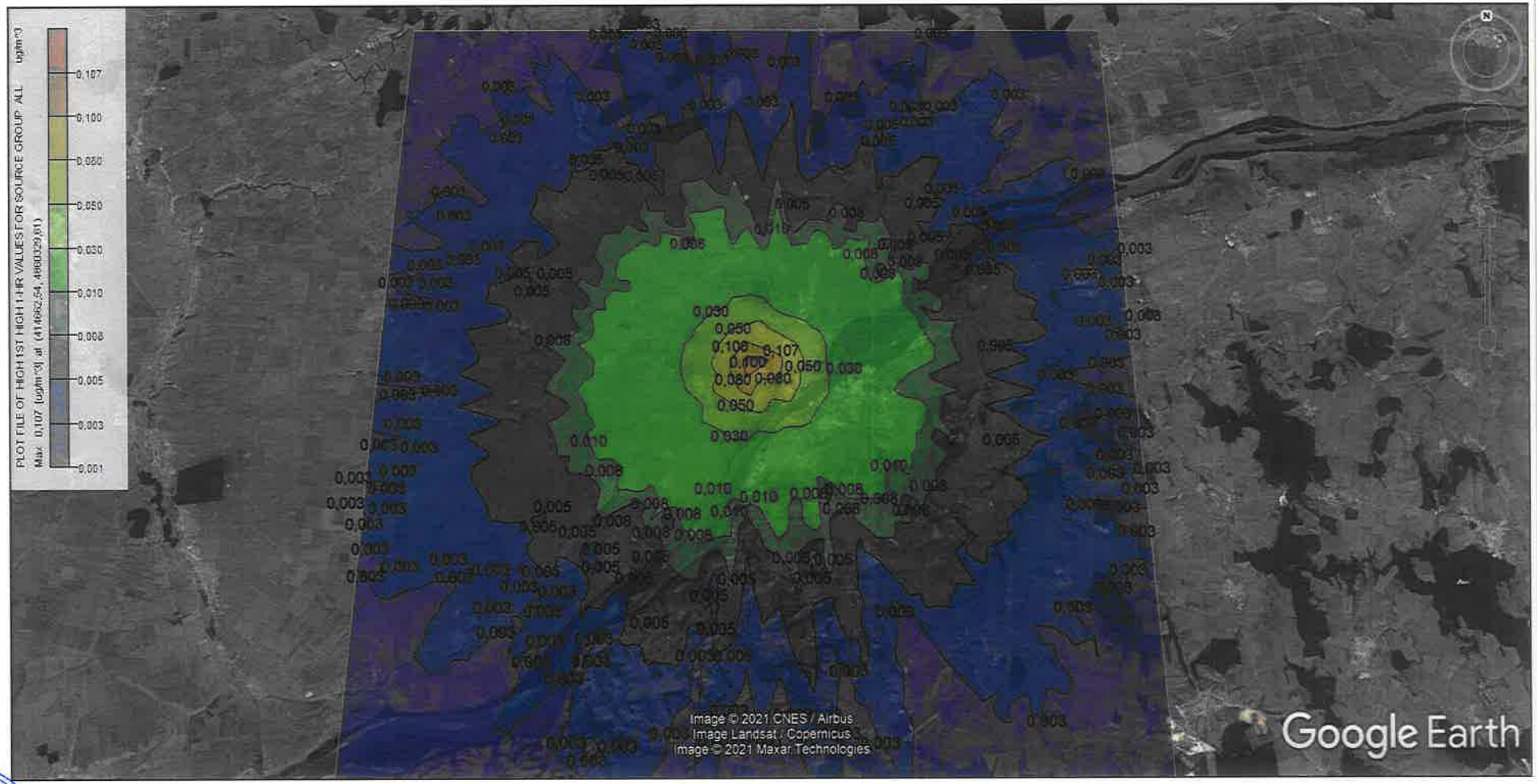


Figure 64 - HCl dispersion modelling - averaging period 30 minutes

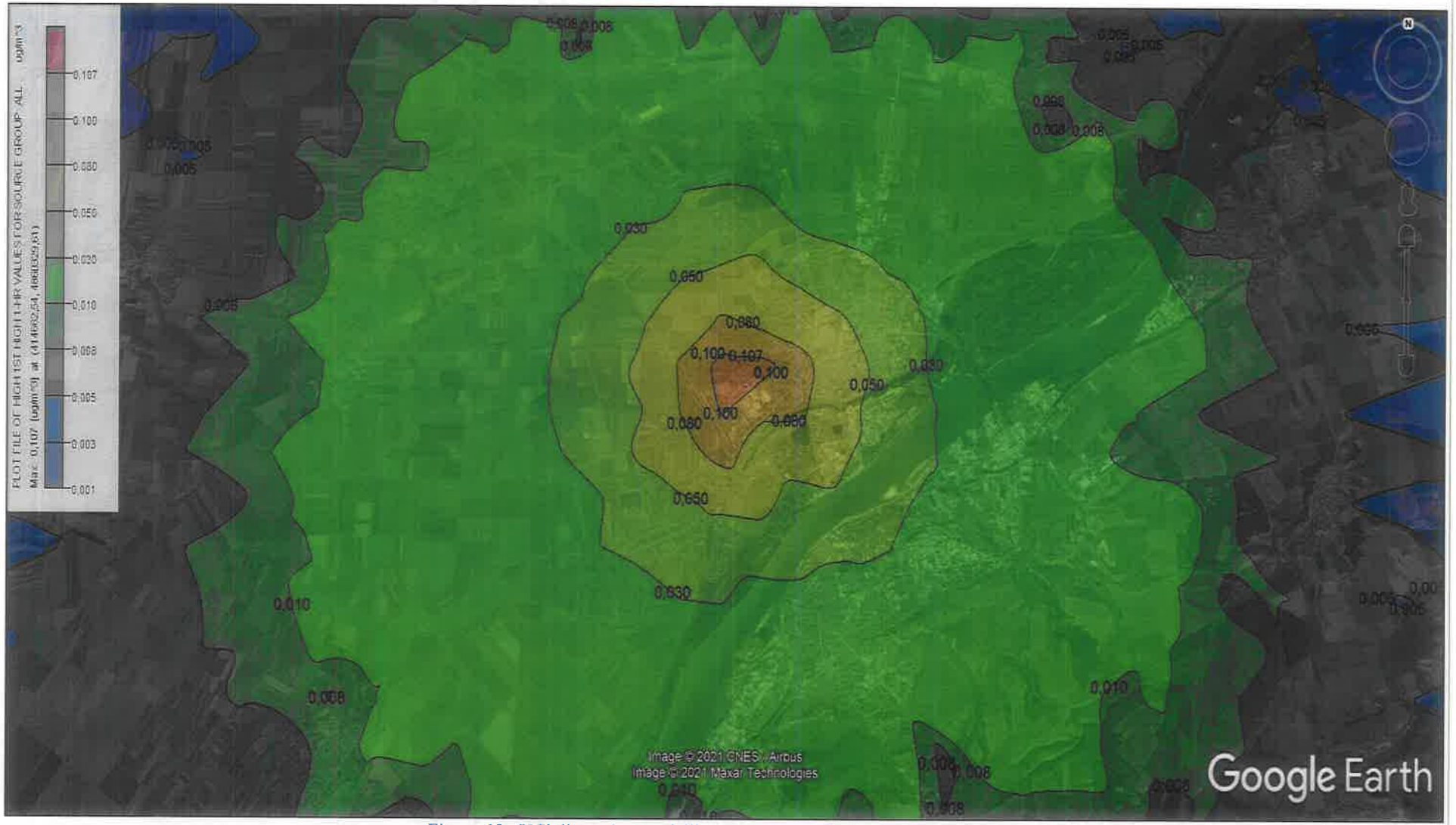


Figure 65 - HCl dispersion modelling - averaging period 30 minutes (detail)

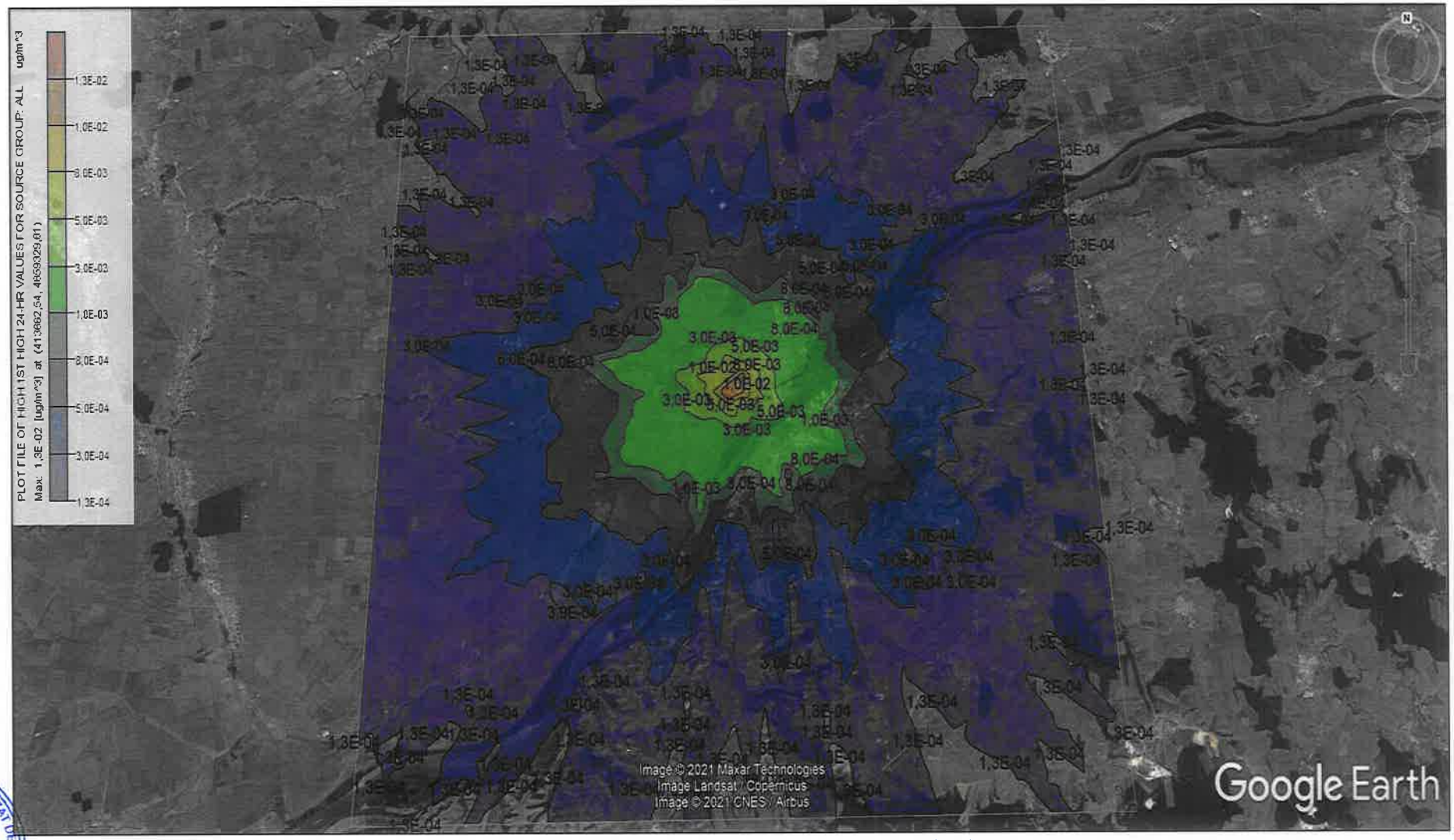


Figure 66 - HCl dispersion modelling - averaging period 24 h

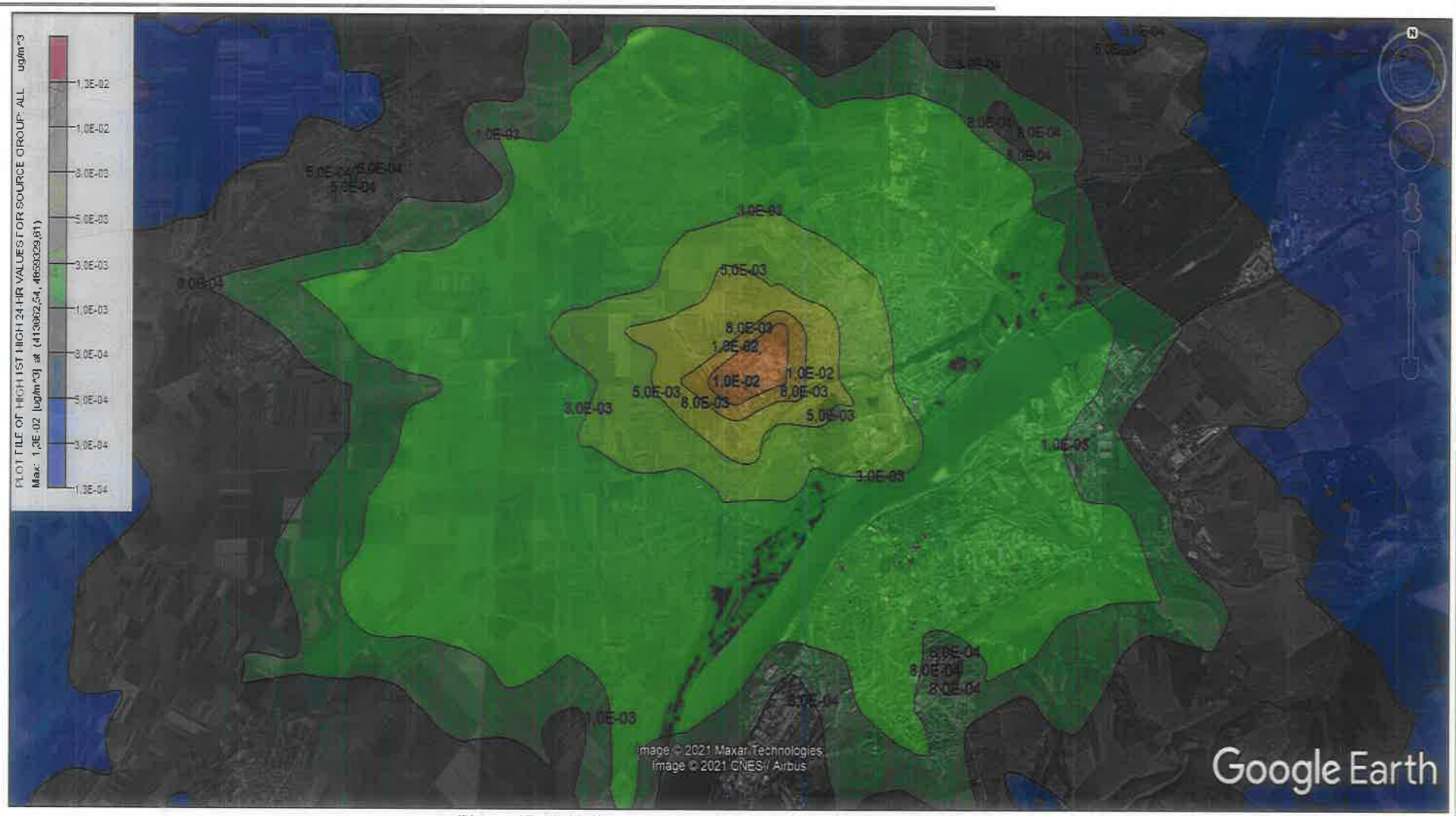


Figure 67 - HCl dispersion modelling - averaging period 24 h (detail)

HF

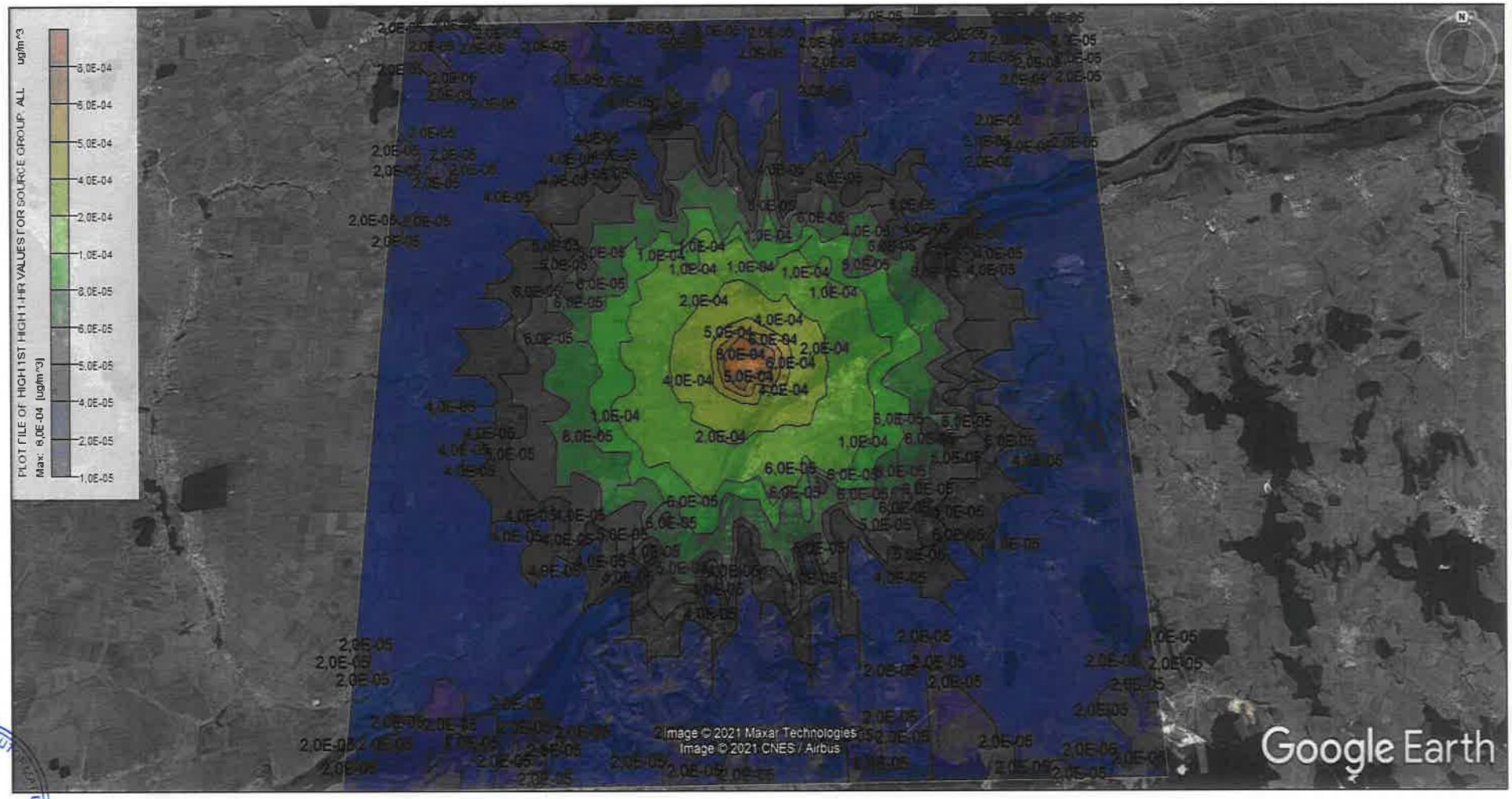


Figure 68 - HF dispersion modelling - averaging period 30 minutes

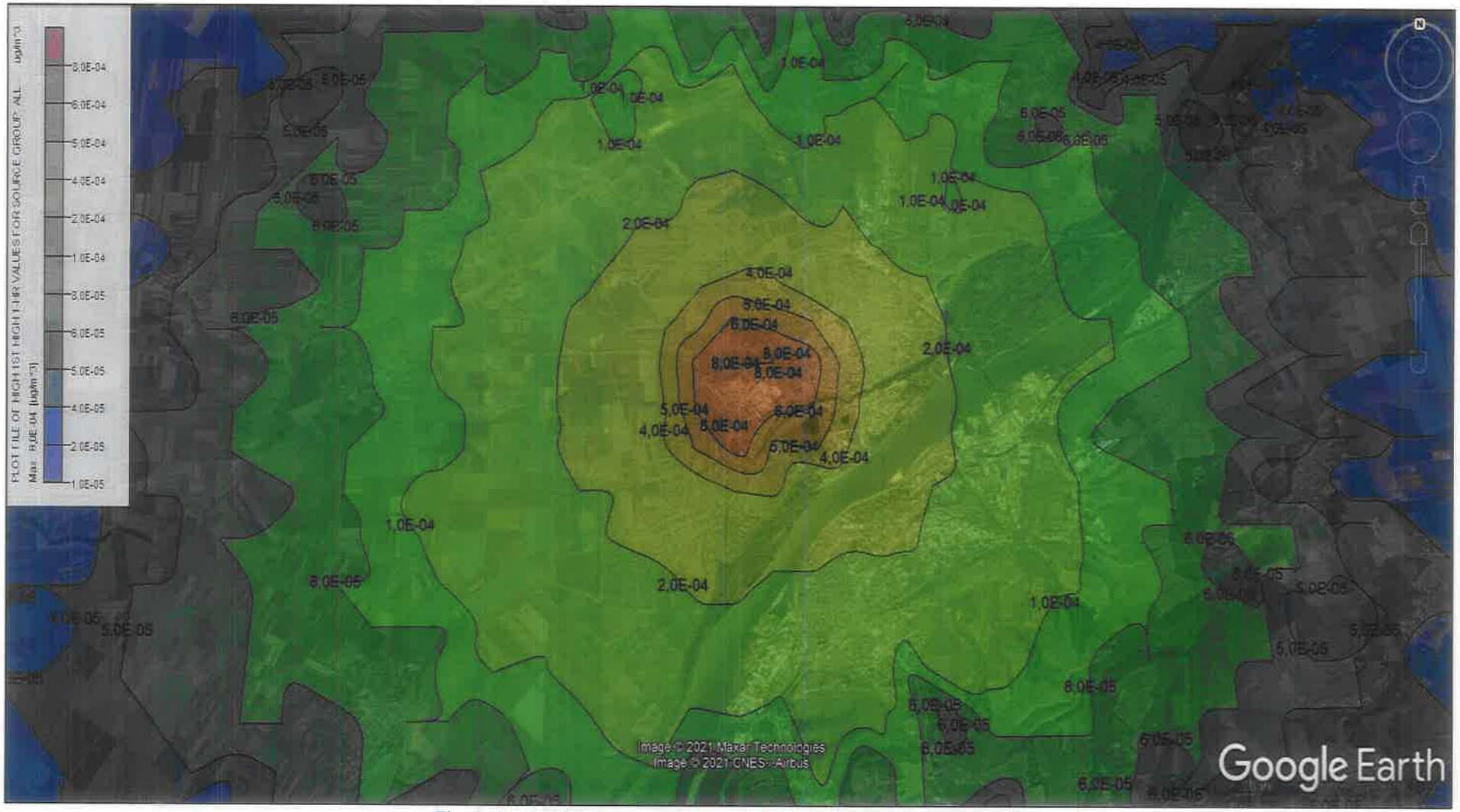


Figure 69 - HF dispersion modelling - averaging period 30 minutes (detail)

Figure 70 - TOC dispersion modelling - 24 h averaging period

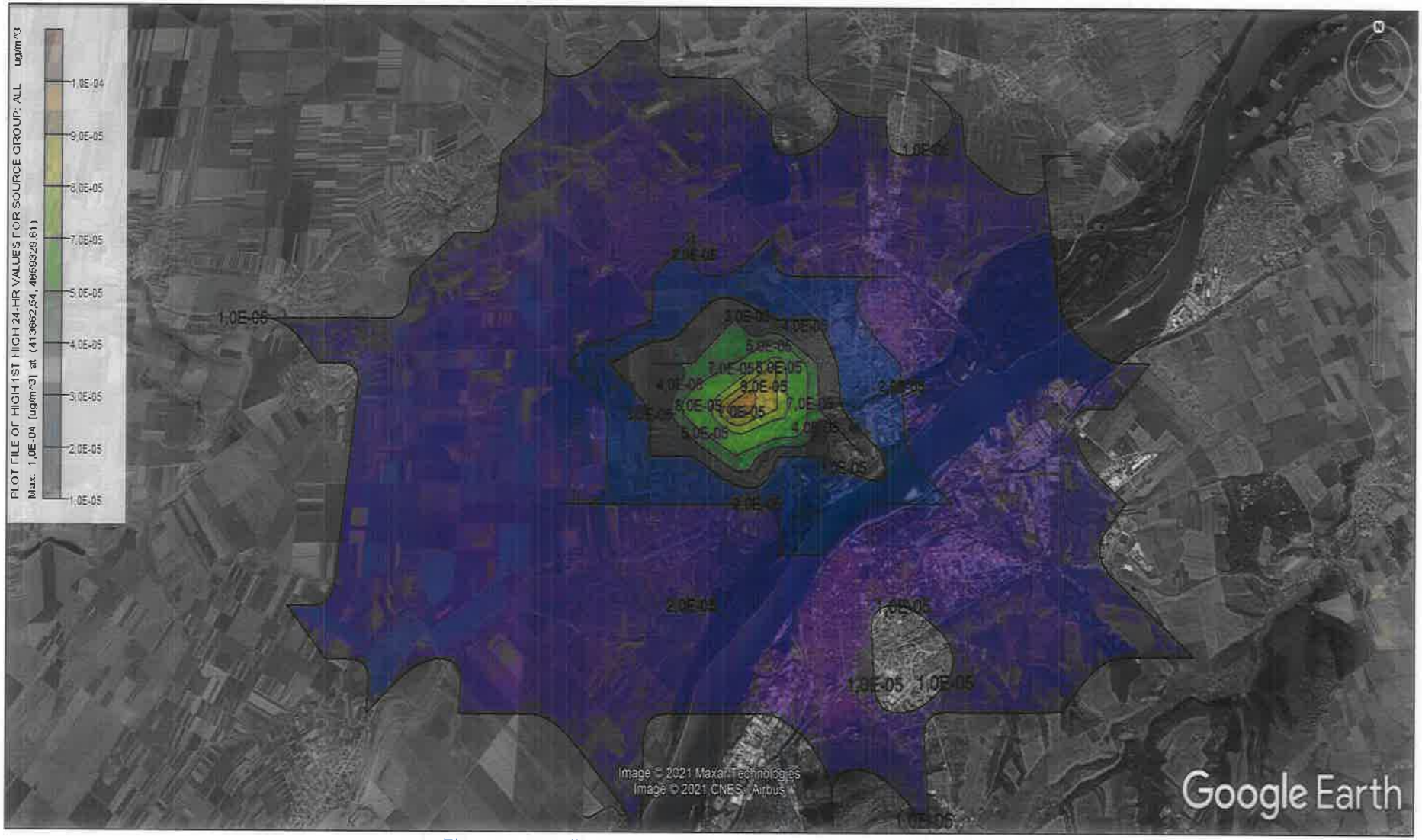


Figure 71 - HF dispersion modelling - 24 h averaging period (detail)

COT

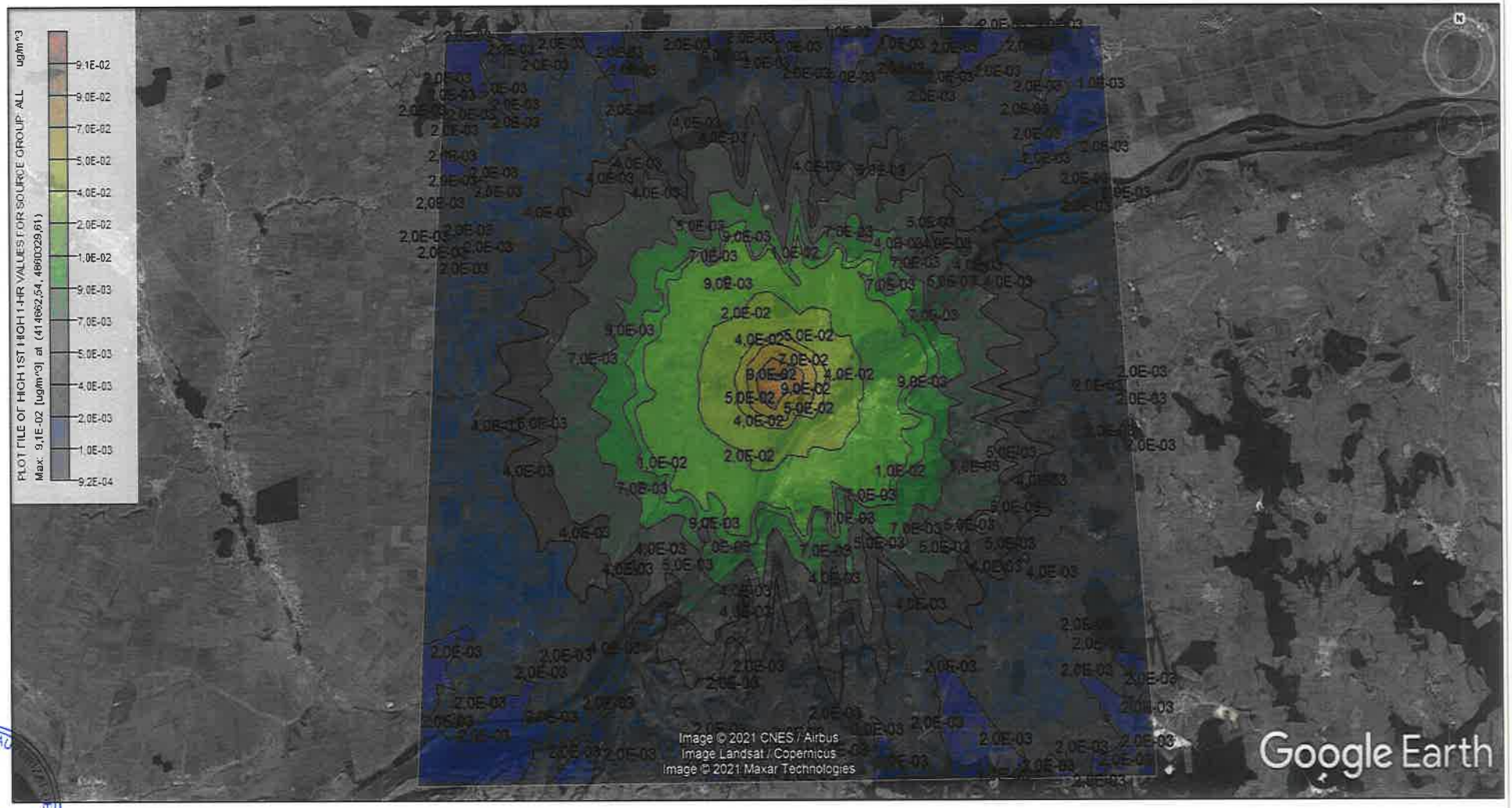


Figure 72 - TOC dispersion modelling - averaging period 30 minutes

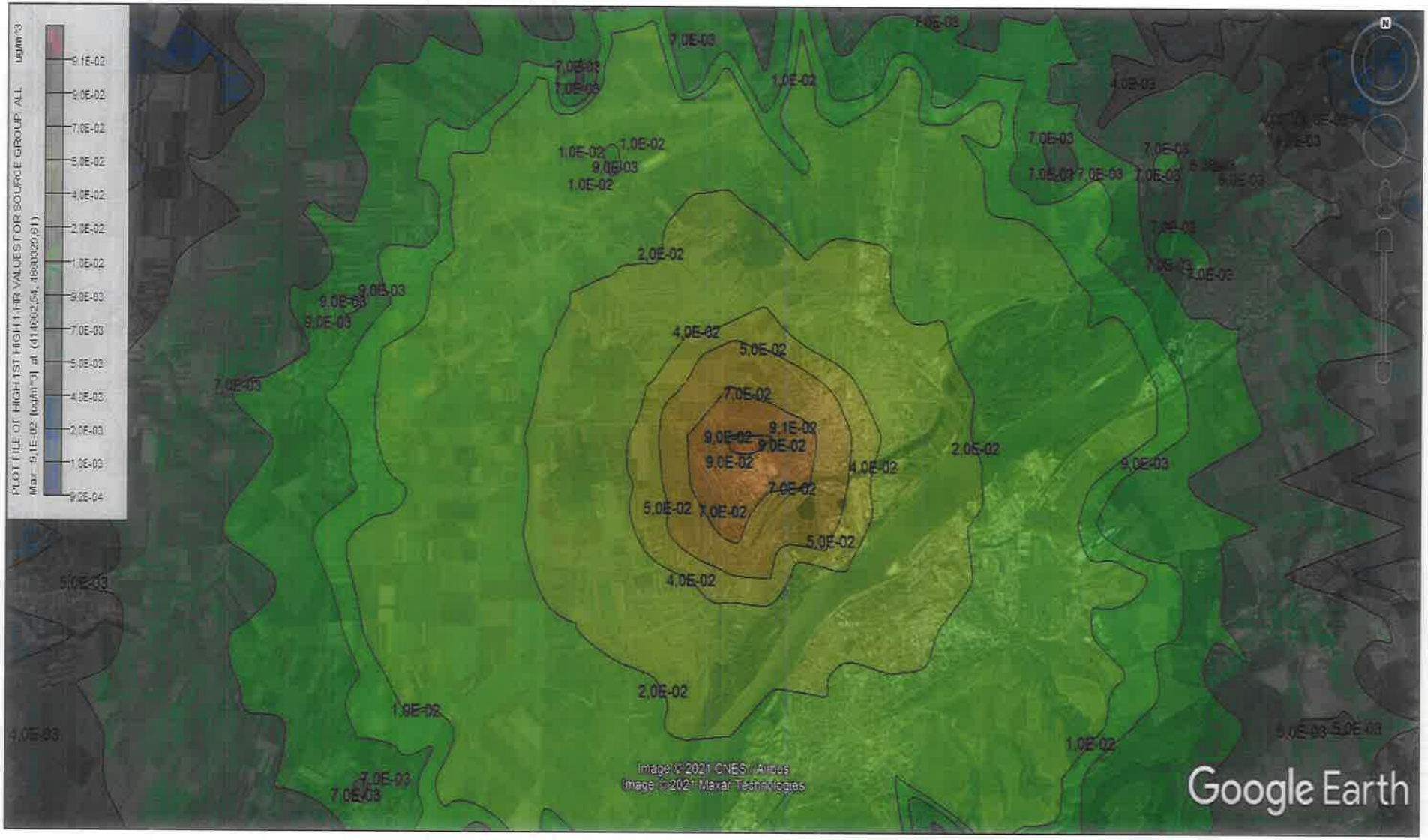


Figure 73 - TOC dispersion modelling - averaging period 30 minutes (detail)

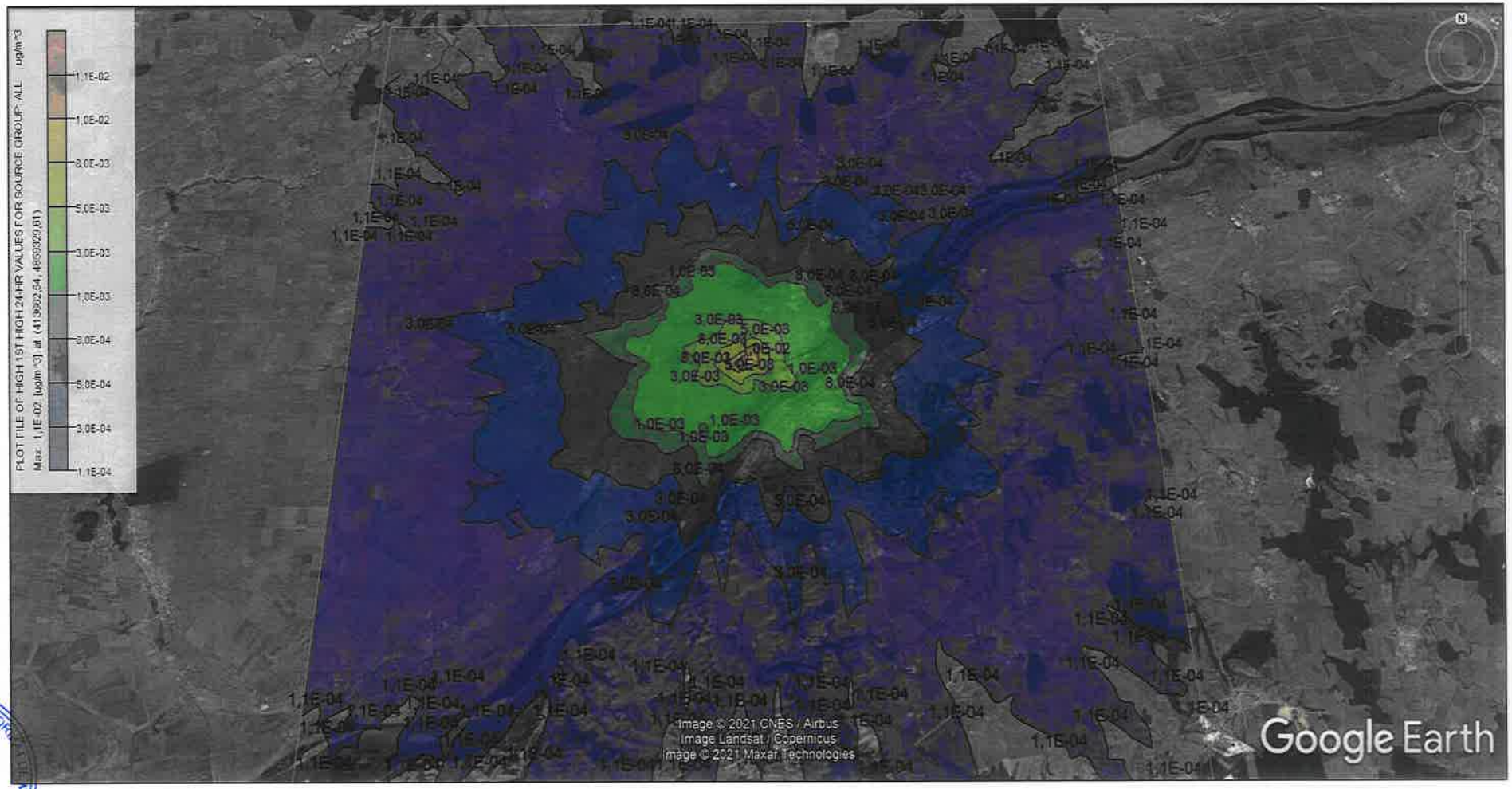


Figure 74 - TOC dispersion modelling - 24 h averaging period

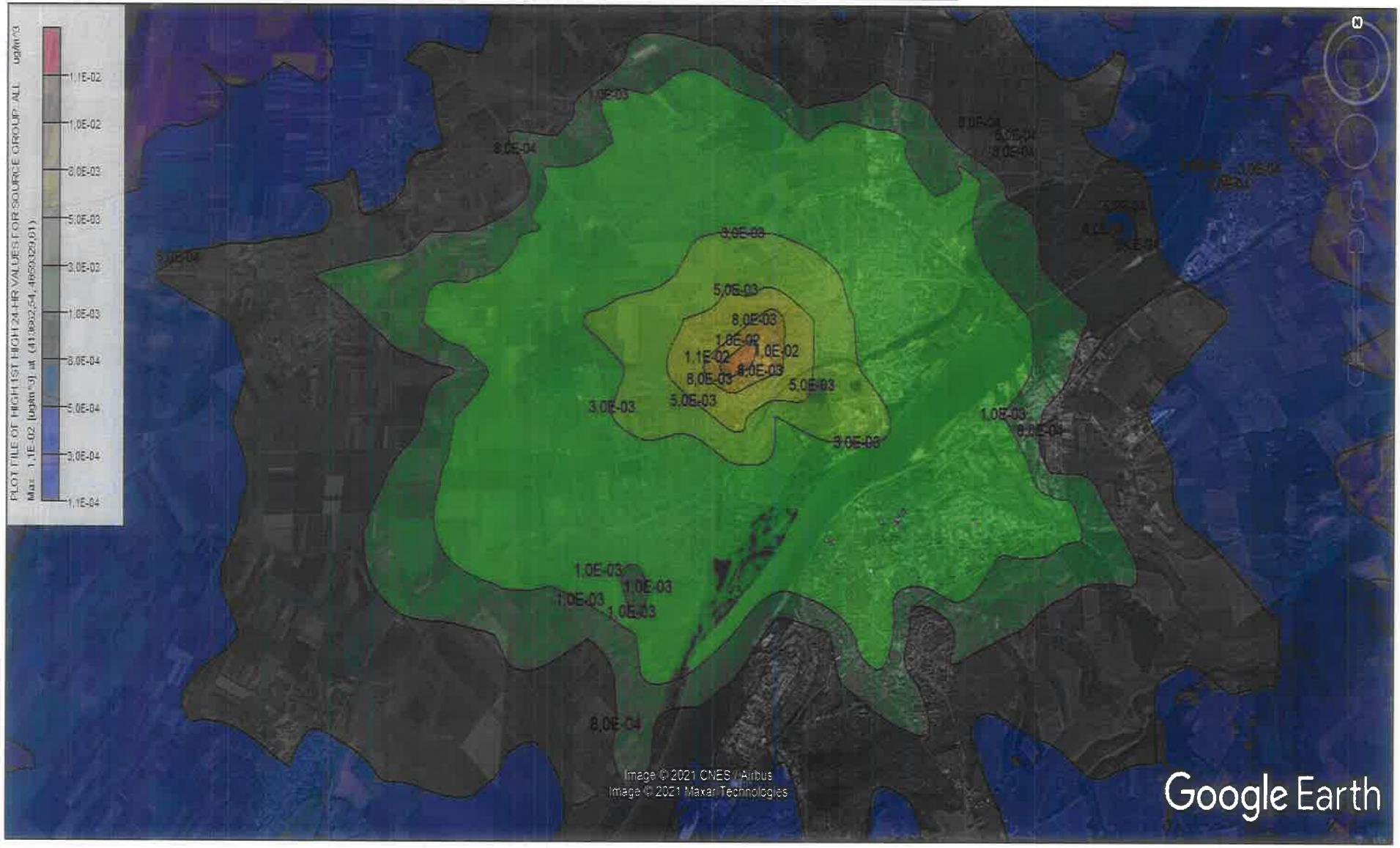


Figure 75 - TOC dispersion modelling - 24 h averaging period (detail)

DIOXINS AND FURANS

An attempt was made to model the dispersion of dioxin and furan concentrations in immission, but the software reported that it was impossible to construct dispersion diagrams because the concentration in emission was too low. The message issued by the software is as below:

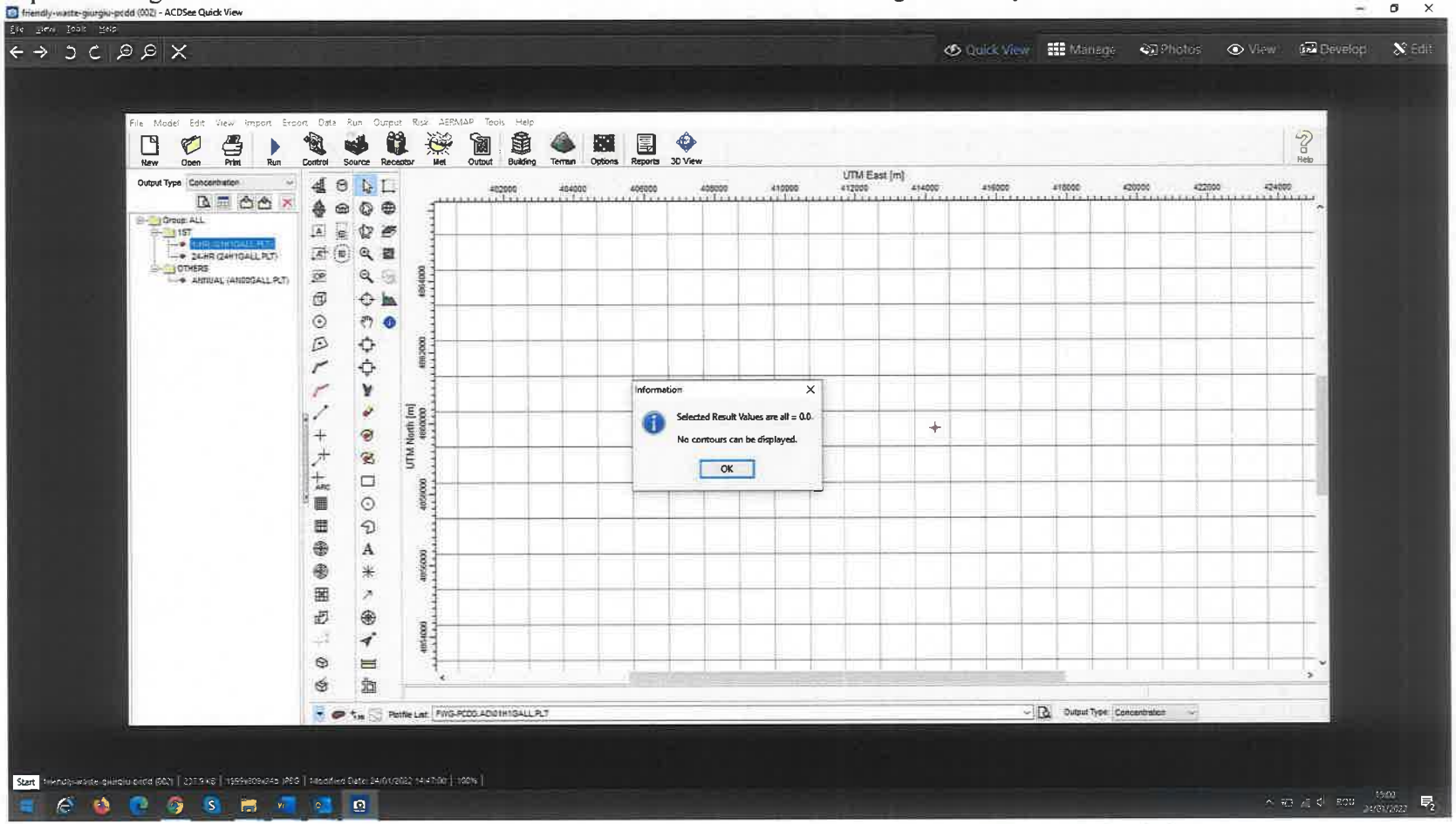


Figure 76 - Soft message from the dioxin and furan concentration dispersion modelling test in immissions

In order to draw up scatter plots of dioxin and furan emission concentrations, 1000-fold values were entered into the modelling software, after which, when interpreting the plots, the coefficient of return to the initial values, i.e. x 10^{-3}, was applied and the values were entered into the comparative tables. The diagrams obtained are shown below:

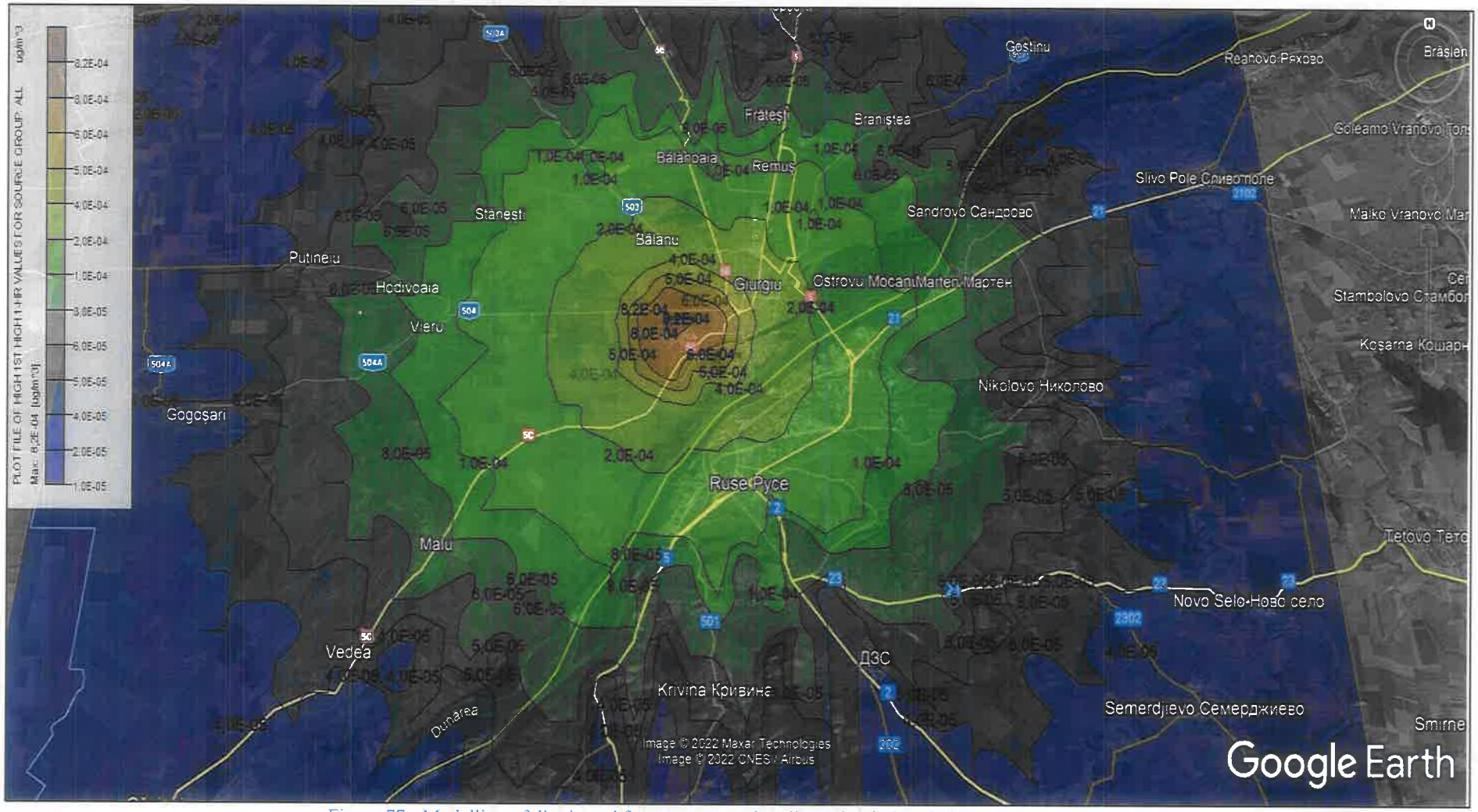


Figure 77 - Modelling of dioxin and furan concentration dispersion in immissions - 1 h averaging period

Figure 78 - Modelling of dioxin and furan concentration dispersion in immissions - 1 h averaging period (detail)

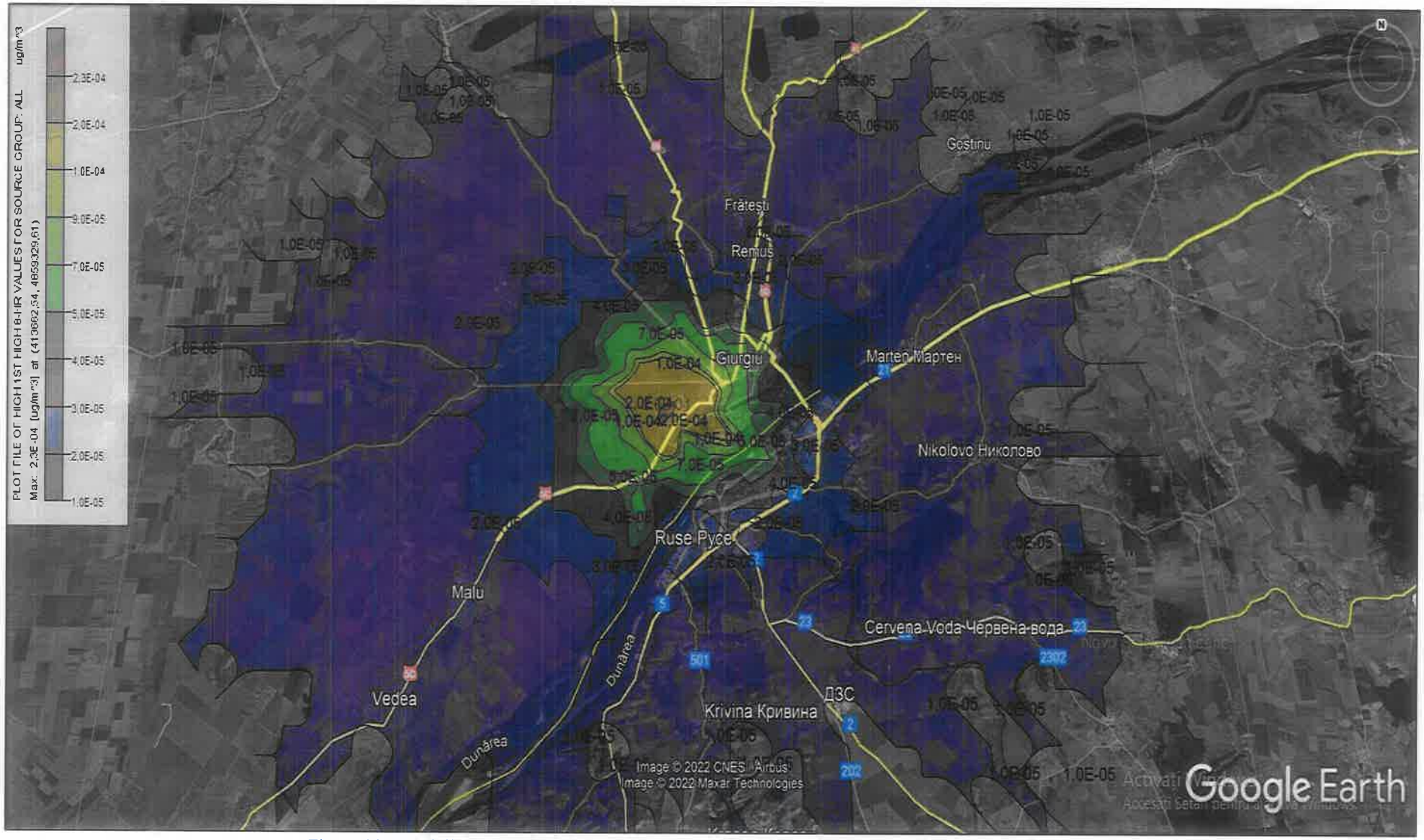


Figure 79 - Modelling of dioxin and furan concentration dispersion in immissions - 8 h averaging period

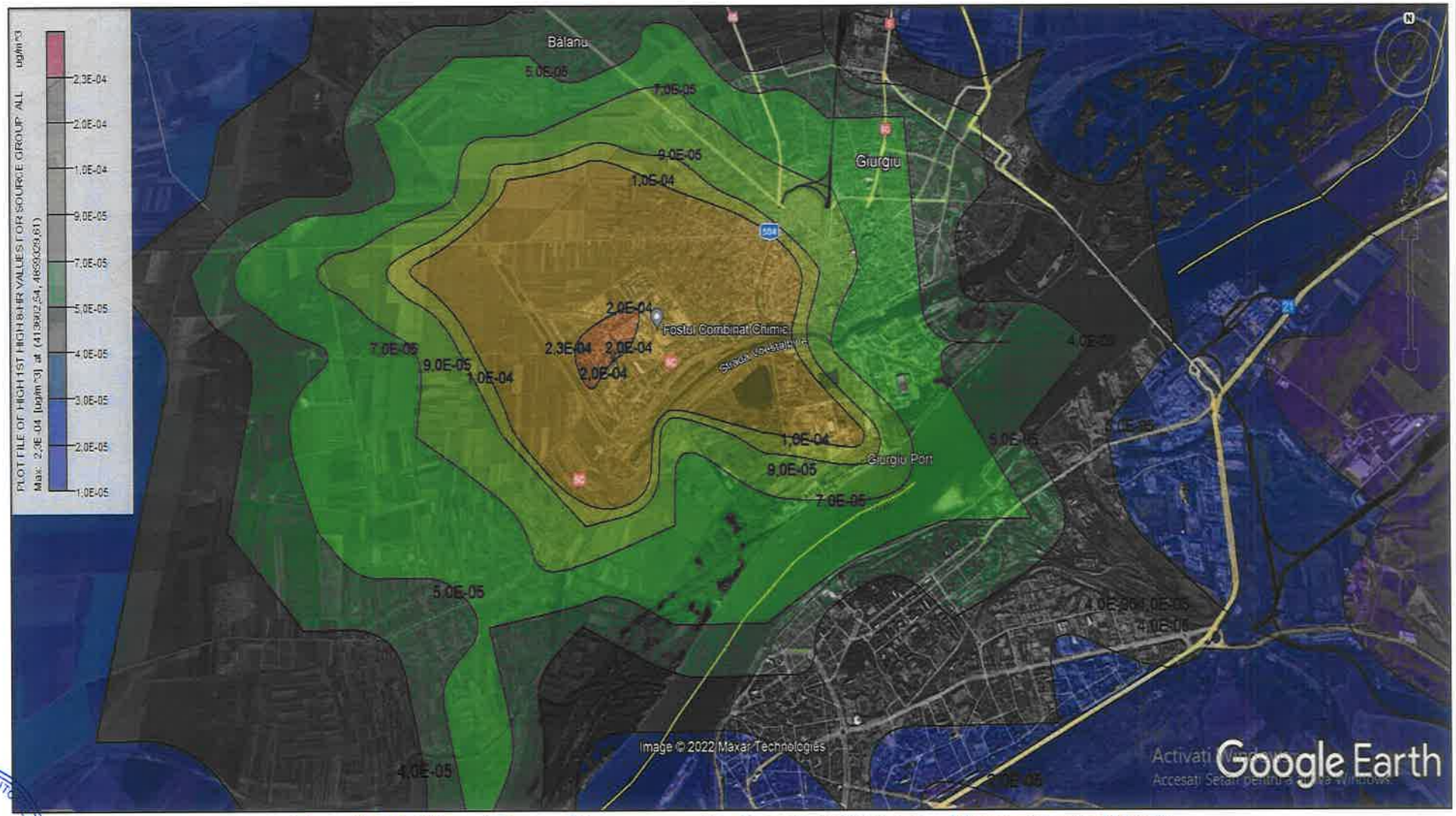


Figure 80 - Modelling of dioxin and furan concentration dispersion in immissions - 8 h averaging period (detail)

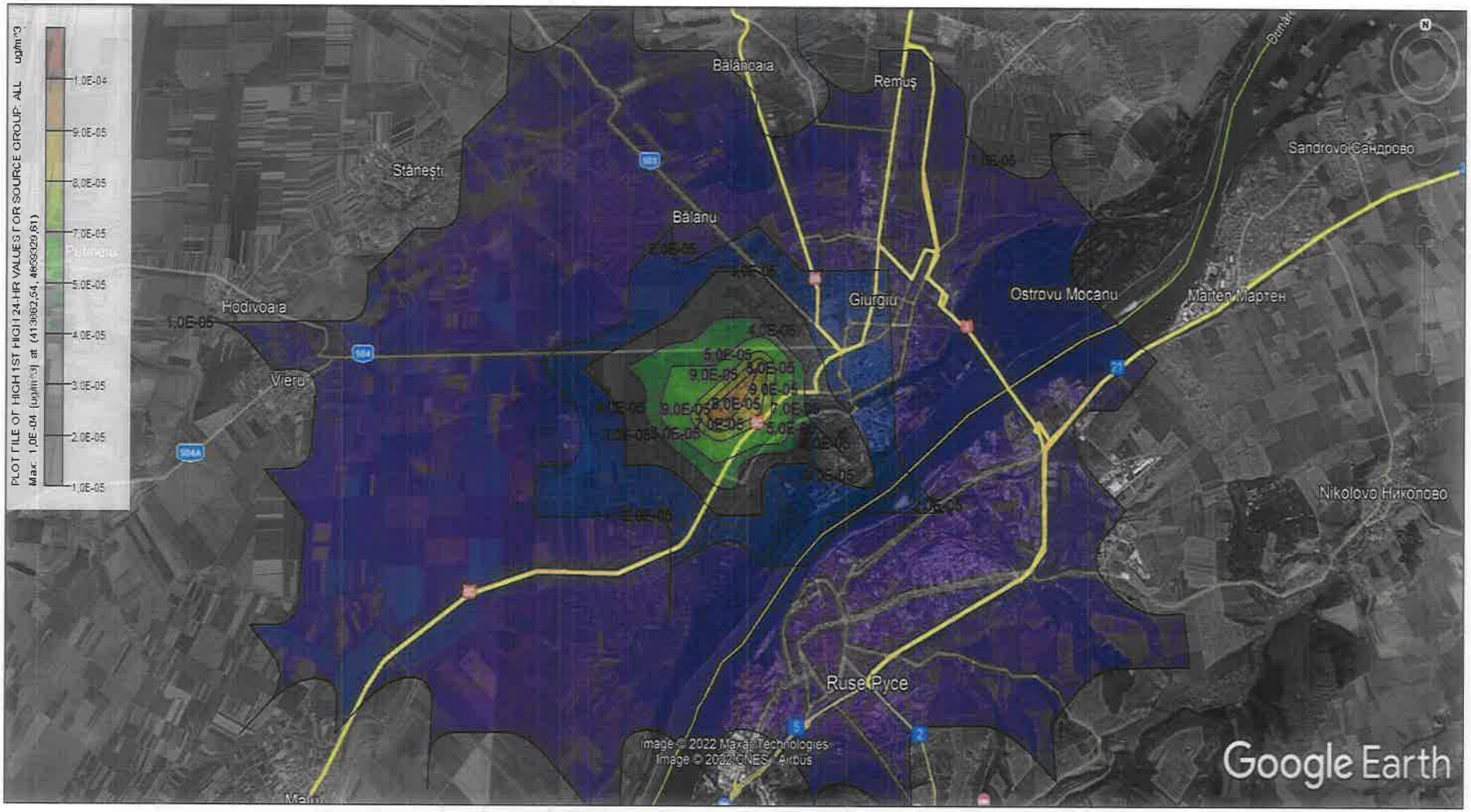


Figure 81 - Modelling of dioxin and furan concentration dispersion in immissions - 24 h averaging period

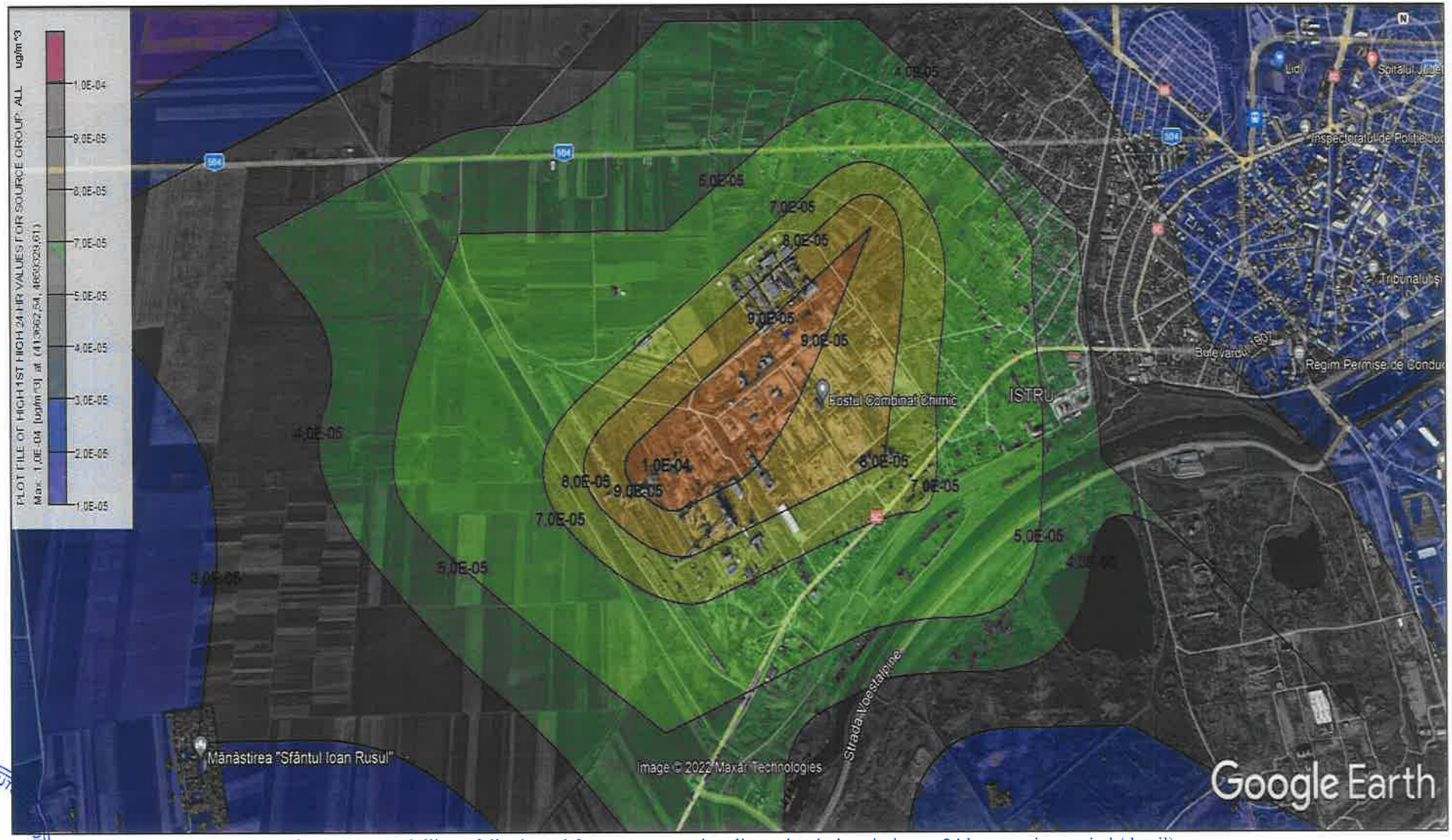


Figure 82 - Modelling of dioxin and furan concentration dispersion in immissions - 24 h averaging period (detail)

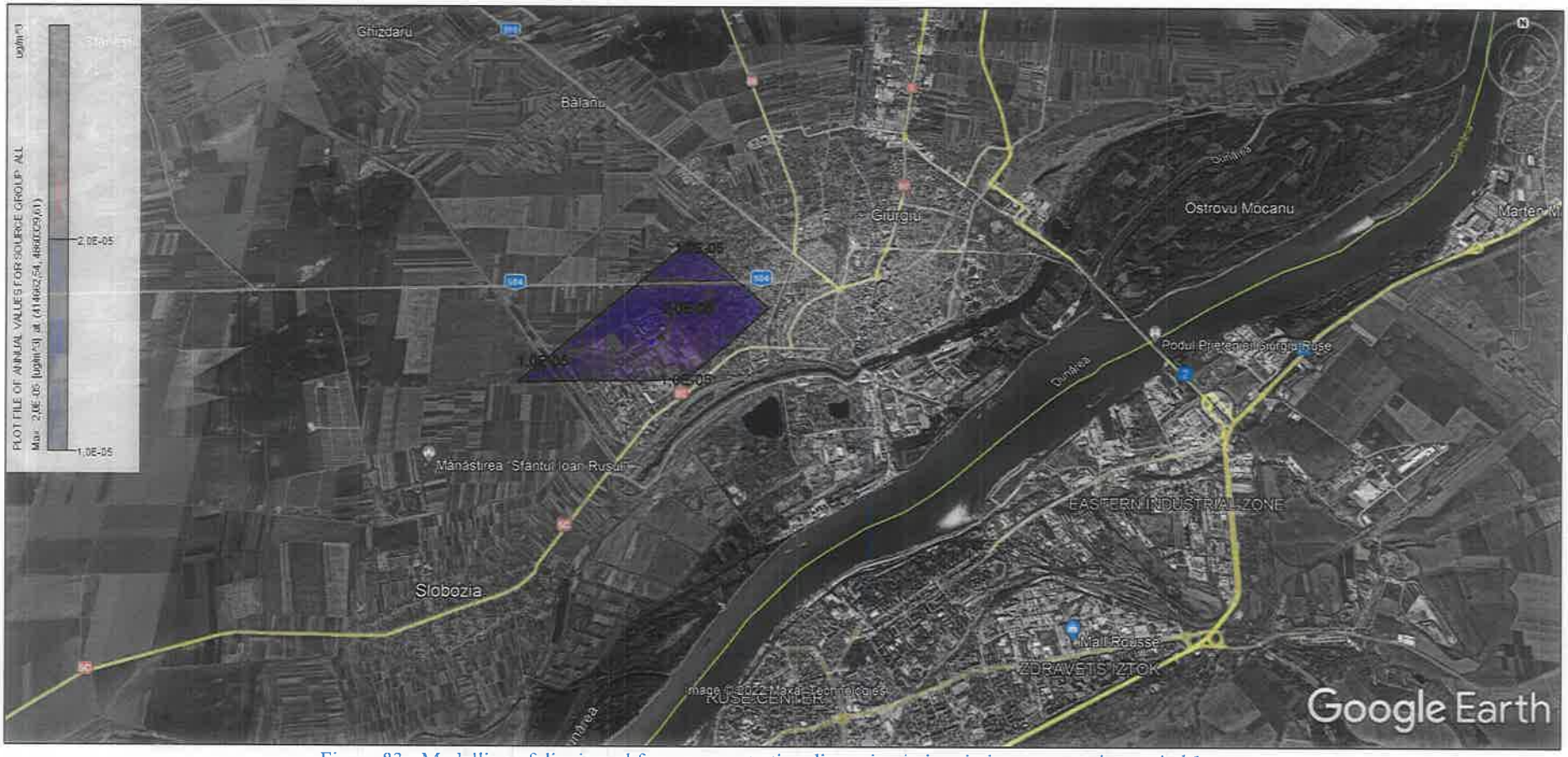


Figure 83 - Modelling of dioxin and furan concentration dispersion in immissions - averaging period 1 year

We reiterate that the values in the dioxin and furan dispersion diagrams are 1000 times higher than the actual values and were used only for the purpose of constructing the diagrams.

Centralization of data obtained from mathematical modelling of pollutant dispersion in the atmosphere:

CARBON MONOXIDE (CO)

Table 62 - Variation of CO concentration in relation to distance from the emission point

Propagation distances (m)			Concentrations determined by mathematical dispersion modelling (µg/m3)			Human health						Ecosystems			Obs.
						Hourly value (µg/m3)			Daily value (µg/m3)						
8 h	24 h	1 year	8 h	24 h	1 year	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
900			0.4						10000	7000	5000				< VL
2900			0.2												< VL
Bulgaria[41]			**0.1**												< VL
Ruse city[42]			0.1												
4000			0.1												< VL
5300			0.08												< VL
6700			0.06												< VL
10000			0.02												< VL
15000			0.008												< VL
	1380			0.1											< VL
	1660			0.08											< VL
	3340			0.05											< VL
	Bulgaria			**0.03**											< VL
	Ruse city			0.03											
	5080			0.03											< VL
	10000			0.01											< VL
	15000			0.05											< VL
		760			0.02										< VL
		1290			0.01										< VL
		1500			0.006										< VL
		1900			0.004										< VL
		Bulgaria			**0.001**										< VL
		Ruse city			0.001										
		5000			0.001										< VL
		10000			-										< VL
		15000			-										< VL

[41] at the border with Bulgaria at a distance of 3317 m
[42] at the border of the residential area of Ruse at a distance of 3856 m

NO_x

Table 63 - Variation of NOx concentration with distance from the emission point

Propagation distances (m)			Concentrations determined by mathematical dispersion modelling (µg/m3)			Human health						Vegetation			Obs.
						Hourly value (µg/m3)			Annual value (µg/m3)						
1 h	24 h	1 year	1 h	24 h	1 year	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
400			1			200	140	100	40	32	26	30	24	19.5	< VL
1900			0.8												< VL
3390			0.5												< VL
Bulgaria			**0.4**												< VL
Ruse city			0.4												
5330			0.3												< VL
355			5												< VL
10000			0.1												< VL
15000			0.05												< VL
	890			0.1											< VL
	1450			0.08											< VL
	2800			0.05											< VL
	Bulgaria			**0.03**											< VL
	Ruse city			0.03											
	3680			0.03											< VL
	8000			0.01											< VL
	10000			0.005											< VL
	15000			0.003											< VL
		960			0.01										< VL
		1400			0.007										< VL
		1700			0.005										< VL
		2200			0.003										< VL
		Bulgaria			**0.001**										< VL
		Ruse city			0.001										
		3880			0.001										< VL
		7900			0.00032										< VL
		10000			-										< VL
		15000			-										< VL

SO_x

Table 64 - Variation of SO_2 concentration in relation to distance from the emission point

Propagation distances (m)			Concentrations determined by mathematical dispersion modelling (µg/m3)			Human health						Vegetation			Obs.
						Hourly value (µg/m3)			Daily value (µg/m3)			Annual value (µg/m3)			
1 h	24 h	1 year	1 h	24 h	1 year	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
540			0.04			350			125	75	50	20	12	8	< VL
3280			0.02												< VL
Bulgaria			**0.02**												< VL
Ruse city			0.02												
6160			0.01												< VL
7500			0.008												< VL
10000			0.006												< VL
15000			0.002												< VL
	350			0.005											< VL
	1440			0.003											< VL
	Bulgaria			**0.001**											< VL
	Ruse city			0.001											
	3840			0.001											< VL
	6880			0.0005											< VL
	10000			0.0003											< VL
	15000			0.00009											< VL
		800			0.001										< VL
		960			0.0008										< VL
		1200			0.0005										< VL
		1570			0.0003										< VL
		2150			0.0001										< VL
		Bulgaria			**0.00005**										< VL
		Ruse city			0.00005										
		3680			0.00005										< VL
		8000			0.000013										< VL
		10000			-										< VL
		15000			-										< VL

TSP

Table 65 - Variation of TSP concentration in relation to distance from the emission point

Propagation distances (m)				Concentrations determined by mathematical dispersion modelling (µg/m3)				Human health						Ecosystems			Obs.
								Hourly value (µg/m3)			Daily value (µg/m3)						
1 h	8 h	24 h	1 year	1 h	8 h	24 h	1 year	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
605				0.02				50	35	25	40	28	20				< VL
3360				0.01													< VL
Bulgaria				**0.01**													< VL
Ruse city				0.01													
5390				0.006													< VL
6230				0.005													< VL
10000				0.002													< VL
15000				0.001													< VL
		875				0.002											< VL
		2730				0.001											< VL
		Bulgaria				**0.0006**											< VL
		Ruse city				0.0006											
		3770				0.0006											< VL
		4800				0.0005											< VL
		10000				0.0001											< VL
		15000				0.00005											< VL
			980				0.0004										< VL
			1640				0.0001										< VL
			2680				0.00005										< VL
			Bulgaria				**0.00002**										< VL
			Ruse city				0.00002										
			4260				0.00002										< VL
			10000				0.00001										< VL
			15000				-										< VL

HCl

Table 66 - Variation of HCl concentration in relation to distance from emission point

Propagation distances (m)		Concentrations determined by mathematical dispersion modelling (µg/m3)		Human health						Vegetation (µg/m3)			Obs.
				Hourly value (µg/m3)			Annual value (µg/m3)						
30 min.	24 h	30 min.	24 h	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
400		0.1											
1500		0.08											
3010		0.05											
Bulgaria		**0.03**											
Ruse city		**0.03**											
4915		0.03											
10000		0.01											
15000		0.003											
	775		0.01										
	1180		0.008										
	1760		0.005										
	Bulgaria		**0.003**										
	Ruse city		**0.003**										
	3640		0.003										
	7370		0.001										
	10000		0.0005										
	15000		0.0003										

HF

Table 67 - Variation of HF concentration versus distance from emission point

Propagation distances (m)		Concentrations determined by mathematical dispersion modelling (µg/m3)		Human health						Vegetation			Obs.
				Hourly value (µg/m3)			Annual value (µg/m3)						
30 min.	24 h	30 min.	24 h	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
1630		0.0006											
2185		0.0005											
2830		0.0004											
Bulgaria		**0.0001**											
Ruse city		0.0001											
5500		0.0001											
10000		0.00008											
15000		0.00005											
	690		0.00008										
	895		0.00007										
	1410		0.00005										
	1680		0.00004										
	Bulgaria		**0.00002**										
	Ruse city		0.00002										
	3450		0.00003										
	4950		0.00002										
	10000		-										
	15000		-										

COT

Table 68 - Variation of TOC concentration in relation to distance from emission point

Propagation distances (m)		Concentrations determined by mathematical dispersion modelling (µg/m3)		Human health						Vegetation			Obs.
				Hourly value (µg/m3)			Annual value (µg/m3)						
30 min.	24 h	30 min.	24 h	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
1380		0.07											
2610		0.05											
3251		0.04											
Bulgaria		**0.03**											
Ruse city		**0.03**											
6045		0.02											
10000		0.007											
15000		0.005											
	715		0.008										
	1300		0.005										
	3370		0.003										
	Bulgaria		**0.001**										
	Ruse city		**0.001**										
	6390		0.001										
	7500		0.0008										
	10000		0.0005										
	15000		0.0003										

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DIOXINS AND FURANS

Table 69 - Variation of PCDD & PCDF concentration in relation to distance from emission point (values in µg/mc x 10^{-6})

Propagation distances (m)				Concentrations determined by mathematical dispersion modelling (µg/mc x 10^{-6})				Human health						Ecosystems			Obs.
								Value of 8 hours (pg I.TEQ/Nmc)			Daily value (pg I.TEQ/Nmc)						
1 h	8 h	24 h	1 year	1 h	8 h	24 h	1 year	peak values[43]	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
840				0.0008				0.3									< VL
1600				0.0006													< VL
2250				0.0005													< VL
2900				0.0004													< VL
Bulgaria				**0.0003**													< VL
Ruse city				0.0003													< VL
5600				0.0002													< VL
	1100				0.0002												< VL
	3050				0.0001												< VL
	3300				0.00009												< VL
	Bulgaria				**0.00009**												< VL
	3750				0.00007												< VL
	Ruse city				0.00007												< VL
	5030				0.00005												< VL
		900				0.00009											< VL
		1050				0.00008											< VL
		1230				0.00007											< VL
		1600				0.00005											< VL
		Bulgaria				**0.00004**											< VL
		3450				0.00003											< VL
		Ruse city				0.00003											< VL
		5000				0.00002											< VL
			1680				0.00001										< VL
			Bulgaria				-										< VL
			Ruse city				-										< VL

[43] there is no worldwide limit value for the concentration of dioxins and furans in immission, but in expert studies a value of 0.3 pg I.TEQ/Nmc - (U.S. Environmental Protection Agency) for an averaging period of 8 hours

Table 70 - Variation of PCDD & PCDF concentration in relation to distance from the emission point (values in pg I.TEQ/Nmc)

Propagation distances (m)				Concentrations determined by mathematical dispersion modelling (pg I.TEQ/Nmc)				Human health						Ecosystems			Obs.
								Hourly value (pg I.TEQ/Nmc)			Daily value (pg I.TEQ/Nmc)						
1 h	8 h	24 h	1 year	1 h	8 h	24 h	1 year	peak values[44]	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
840				0.08				0.3									< VL
1600				0.06													< VL
2250				0.05													< VL
2900				0.04													< VL
Bulgaria				**0.03**													< VL
Ruse city				0.03													< VL
5600				0.02													< VL
	1100				0, 02												< VL
	3050				0, 01												< VL
	3300				0, 009												< VL
	Bulgaria				**0.009**												< VL
	3750				0.007												< VL
	Ruse city				0.007												< VL
	5030				0, 005												< VL
		900				0.009											< VL
		1050				0.008											< VL
		1230				0.007											< VL
		1600				0.005											< VL
		Bulgaria				**0.004**											< VL
		3450				0.003											< VL
		Ruse city				0.003											< VL
		5000				0.002											< VL
			1680				0.001										< VL
			Bulgaria				-										< VL
			Ruse city				-										< VL

[44] there is no worldwide limit value for the concentration of dioxins and furans in immission, but in expert studies a value of 0.3 pg I.TEQ/Nmc - (U.S. Environmental Protection Agency) for an averaging period of 8 hours

Conclusions on emissions and immissions

a) Concerning directed emissions:

For the assessment of the level of pollutant emissions resulting from the operation of the combustion plant, theoretical calculations were made for the pollutant emissions depending on the fuel consumption and type of fuel used, calorific value and emission factor.

The calculation was performed for a calorific value of the fuel used of 11070 kcal/kg (45 MJ/kg - the lower calorific value of LPG).

The combustion source is the burners of the combustion and afterburners. The flue gas discharge is directed through the dispersion stack (D = 0.5 m; H = 10 m).

The assessment was made by comparison with the limits allowed by Law 278/2013.

According to the results presented in chapter 4.2.3. the calculated values were below the limit allowed according to VLE of Law 278/2013.

As the burners in the incinerator are among the most efficient (very low NO_x) and the fuel used is LPG (sulphur content <10 ppm), the emissions of dust, NOx and SO_2 in the flue gas will be very low. Burning will be controlled so that CO emissions will be low.

Because the incinerator is equipped with:

- secondary combustion chamber
- "dry absorbing system" gas cleaning system
- bag filtration system

emission levels for different types of pollutants, respectively:

- Gaseous and vaporous organic substances, expressed as total organic carbon (COT)
- hydrogen fluoride (HF)
- hydrogen chloride (HCl)
- sulphur dioxide (SO_2)
- nitrogen dioxide (NO_2)
- total dust (TSP)
- dioxins and furans

is very low and below the maximum allowable limits. For the mathematical modelling of the dispersion of these pollutants in the atmosphere, the values from the incinerator technical book and the literature[45] were used.

Table 71 - Maximum values of pollutants emitted into the atmosphere from incinerators with secondary combustion chamber

Parameter	VLE[1]	Maximum values measured at incinerators
Solid particles	10 mg/m³	1.2 mg/m³
Sulfur dioxide	50 mg/m³	2.4 mg/m³
Nitrogen Dioxide*	200 mg/m³	60 mg/m³
HCl	10 mg/m³	5.38 mg/m³
HF	1 mg/m³	0.04 mg/m³
COT	10 mg/m³	4.6 mg/m³
CO		78.3 mg/m³

Concerning nitrogen oxides (NO_X):

[45] U.S. Environmental Protection Agency; Inciner8.com; NCBI – Waste Incineration & Public Health; Water, Sanitation and Health Protection of the Human Environment World Health Organization Geneva – Findings on an Assessment of Small-cale Incinerators for Health-care Waste

[1] average daily emission values according to Annex 6, L 278/2013

To reduce NO_x emissions, NO_x burners. It is assessed that the permissible emission limits will not be exceeded. According to Law 278/2013, Annex 6, NO_x peak value allowed for incinerators with a nominal capacity less than or equal to 6 tonnes per hour is 400 mg/Nmc.

Concerning sulphur dioxide (so2):

Sulphur oxide emissions are mainly caused by the presence of sulphur in fuel... The use of gaseous fuel will therefore result in insignificant so2 emissions. (According to Law 278/2013, Annex 6, the permissible peak value for sulphur dioxide in waste incinerators is 50 mg/Nmc for the reference value of 3% o2);

About powders: It is estimated that the combustion of purified gas is not a significant source of dust emissions. According to Law 278/2013, Annex 6, the permissible peak value for dust in waste incinerators is 30 mg/Nmc (100% A) or 10 mg/Nmc (97% B) - average emission limit values for half an hour.

The total dust concentration of the air emissions of the incinerator shall in no case exceed 150 mg/Nm^3expressed as a half-hourly average.

Concerning carbon oxide (CO):

Carbon monoxide always occurs as an intermediate product of the combustion process, especially under substoichiometric combustion conditions. The reduction of CO concentrations resulting from the combustion process will be achieved through combustion control and monitoring.

After commissioning, emissions at the flue gas stack will be monitored to verify the evaluated data and compliance with the limits allowed by Law 278/2013. Limits will be observed (except for the start/stop phase):

- 50 mg/Nm^3 in flue gas determined as a daily average value;
- 100 mg/Nm^3 in flue gas from all measurements (determined as half-hourly averages taken over 24 hours);
- 150 mg/Nm^3 in flue gas at a minimum of 95% of all measurements (determined as 10-minute averages).

To assess the values:

1. average values in half an hour for the pollutants:
   - Gaseous and vaporous organic substances, expressed as total organic carbon (COT)
   - hydrogen fluoride (HF)
   - hydrogen chloride (HCl)
2. daily average values for pollutants:
   - Gaseous and vaporous organic substances, expressed as total organic carbon (COT)
   - hydrogen fluoride (HF)
   - hydrogen chloride (HCl)
   - sulphur dioxide (SO_2)
   - nitrogen dioxide (NO_2)
   - total dust (TSP)
3. average values over a sampling period of minimum 6 hours and maximum 8 hours for pollutants:
   - dioxins and furans

measurements will be carried out during the operation of the incinerator, as no information other than that in the technical books of the equipment is available at this time and that the values indicated in L 278/2013, point 1.4, part 3, Annex 6, respectively, must not be exceeded:

Table 72 - Half-hourly average emission limit values (mg/Nmc)

Pollutant	(100%) A	(97%) B
Total dust	30	10
Organic substances in gaseous or vaporous state, expressed as total organic carbon (COT)	20	10
Hydrogen chloride (HCl)	60	10
Hydrogen fluoride (HF)	4	2
Sulphur dioxide (SO_2)	200	50
Nitrogen monoxide (NO) and nitrogen dioxide$_{NO2}$ expressed as NO_2 for existing waste incineration plants with a nominal capacity exceeding 6 tonnes per hour or for new waste incineration plants	400	200

Table 73 - Daily average emission peak values

Pollutant	(mg/Nmc)
Total dust	10
Organic substances in gaseous or vaporous state, expressed as total organic carbon (COT)	10
Hydrogen chloride (HCl)	10
Hydrogen fluoride (HF)	1
Sulphur dioxide (SO_2)	50
Nitrogen monoxide (NO) and nitrogen dioxide$_{NO2}$ expressed as NO_2 for existing waste incineration plants with a nominal capacity exceeding 6 tonnes per hour or for new waste incineration plants	200
Nitrogen monoxide (NO) and nitrogen dioxide NO_2 expressed as NO_2 for existing waste incineration plants with a nominal capacity of less than 6 tonnes per hour	400

b) *Concerning undirected emissions:*

In view of the measures envisaged it is considered that there will be no specific detectable emissions in sensitive areas.

Concerning uncontrolled COV *emissions*: The diesel tanks are equipped with level sensor, return pipe to the installation for collecting emissions in case of leaks. The route of the fuel (diesel) from the tank to the thermal engines of the vehicle or vehicle equipment is sealed by piping. All these features are designed to reduce undirected COV emissions to 0.

Concerning waste gas emissions: CO, SO2, NOX and COV emissions resulting from the combustion of diesel fuel used by means of car transport are totally insignificant because:

- traffic intensity in the premises will be reduced
- only low-emission vehicles within legal limits (EURO 5 and EURO 6) will be used

c) *On immission*

The prediction of ambient air pollution levels generated by all sources related to the studied objective, at immission, was carried out by mathematical modelling of concentration fields.

The assessment was made by comparison with the provisions of STAS 12574/1987 which includes "Air quality conditions in protected areas" and/or Law 104/2011 on ambient air quality.

For the determination of pollutant concentrations at immission, a mathematical modelling program was used to calculate the concentration field. The coordinate system has been chosen in such a way as to cover the entire area possibly affected. The software was used to draw up ground-level

concentration maps of pollutants, showing the proposed target, the neighborhoods likely to be affected and the iso-concentration curves for the pollutants emitted.

Methodology used to assess the impact of pollutants released into the atmosphere

The degree of pollution of the atmosphere with noxious emissions from S.C. Friendly Waste Romania S.R.L., in relation to the proposed situation, in neighboring areas, was estimated using a mathematical model based on the Gaussian distribution of pollutant concentrations in the atmosphere.

The climatological model used provides the possibility to simulate the transport of gases emitted from sources grouped or spread over a large area and to calculate their average concentrations for different time periods. The model was developed using the full theory of the American ISC3 model (Industrial Sources Complex Models).

The mathematical model used to assess the impact of pollutants released into the atmosphere is the climatological model SIMPG V3 for the calculation of the concentration field and is based on Martin & Tikvart theory.

The results of the concentration estimates were presented above in the form of maps of is concentrations for different averaging periods.

Emission data include source characteristics: geometric height, diameter or area of emission, pollutant discharge velocity and temperature, pollutant mass flow rate.

With regard to emissions, the stack related to the heat source of the incinerator was taken into account. As there is only one heat source, a grid with dimensions 1000 m x 1000 m was used.

The model output consists of magnitudes calculated at each grid point covering the area of influence of the sources and the average concentration of each pollutant. On the basis of these data, concentration and frequency odour curves are plotted on the area map, highlighting the spatial distribution of the concentration field and the level of long-term and short-term air pollution exposure.

Using the climatological model presented, concentrations for the pollution sources within the study objective were calculated. The input data to the program was taken from the previous tables where the physical characteristic of the source, emission rate, flow rate and velocity of the gas discharged into the atmosphere are presented.

Maximum concentrations over short periods of time are based on the worst climatic conditions within the assessed area. Since for the calculated air pollution concentrations two of the above conditions have to be met simultaneously, which is a relatively rare situation, the maximum concentrations over short periods of time should be considered as the theoretical maximum level of pollution caused by the operation of the installation. This situation is unlikely or may occur in the area very rarely and for short periods. The coordinate system has been chosen in such a way as to cover the entire area possibly affected as well as the emission sources. The software was used to draw up ground-level concentration maps of pollutants, showing the proposed target, the neighborhoods likely to be affected and the iso-concentration curves for the pollutants emitted. Iso-concentration curves for the emitted pollutants were plotted within 0.5 km of the emission source. The nearest living area is located on the SW direction at a distance of approx. 1.5 km from the site under analysis.

Impact assessment through dispersion modelling

In order to estimate the possible impact on the neighborhoods of the future objective, the possible range of influence of the pollutants was included, in particular the residential areas at the shortest distance from the objective.

Dispersion maps have been prepared for the following types of pollutant concentrations:

- NO_2
- SO_2
- CO
- PST
- VOC
- HCl

- HF
- COT
- PCDD and PCDF

Dispersion maps were drawn up for the pollutants from the sources, taking into account the type of pollutant, ground conditions, average air temperature, area size and the permissible limit of the pollutant in µg/m3.

Air quality standards at immissions

In Romania, the maximum permissible concentrations for immissions are set by Law 104/2011 on ambient air quality. For the maximum permissible concentrations of immissions for which no values are provided in Law 104/2011, the values provided in STAS 12574/1987 - "Air in protected areas" are valid. The maximum permissible concentrations are set so that compliance with them ensures that the unprotected population is protected against the harmful effects of polluting substances.

The basis for setting the levels we consider acceptable for air concentrations of pollutants is the observation of the adverse effects of noxious substances on humans. Obviously there are limits to air purity such as those that guarantee the protection of vegetation or ecosystems. It can be seen from these data that the concentration values themselves do not tell the whole story; in other words, they would be incomplete without specifying the averaging period of the concentration;

It can be seen that exposures to pollutants are of two kinds: short-term and long-term.

According to Law 104/2011 on ambient air quality, Annex 3, "Determination of requirements for the assessment of concentrations of sulphur dioxide, nitrogen dioxide, and nitrogen oxides, particulate matter PM10 and PM2.5, lead, benzene, carbon monoxide, ozone, arsenic, cadmium, nickel and benzo(a)pyrene in ambient air in a given agglomeration zone", the following limit values are regulated:

Table 74 - Sulphur dioxide (SO2)

	Human health		**Ecosystems**
	Hourly*	Daily	Annually
Peak values	350 µg/m^3	125 µg/m^3	20 µg/m^3
Upper threshold	-	75 µg/m^3	12 µg/m^3
Lower threshold	-	50 µg/m^3	8 µg/m^3

Note: * - not to be exceeded more than 24 times a year
* - not to be exceeded more than 24 times a year

Table 75 - Nitrogen oxides (NOx)

	Human health		Vegetation
	Hourly*	Annually	
Peak values	200 µg/m^3	40 µg/m^3	30 µg/m^3
Upper threshold	140 µg/m^3	32 µg/m^3	24 µg/m^3
Lower threshold	100 µg/m^3	26 µg/m^3	19.5 µg/m^3

Note: * - not to be exceeded more than 18 times a year

Table 76 - Carbon monoxide (CO)

	Daily value (8-hour average)
Peak values	10000 µg/m^3
Upper threshold	7000 µg/m^3
Lower threshold	5000 µg/m^3

Conclusions on the impact of the operation of the target on air environmental factor

The following conclusions can be drawn from the analysis of the emission values generated by the operation of the incinerator and their comparison with the permissible limit values:

- The NO_x, SO_2, CO, solid particle emission values of the analyzed incinerator are totally negligible and within the VLA

- the propagation distances of air pollutant concentrations (for the highest recorded wind speed = 16.9 m/s compared to the annual average speed = 6.9 m/s) are very small and well below the limit of 534 m (distance to the nearest dwelling)

Taking into account the data presented above, the following conclusions can be drawn regarding the impact of the incinerator activity on the environmental factor air:

1. the direct impact is insignificant and is manifested in a very small area that does not go beyond the boundaries of the site
2. there is no indirect or secondary impact
3. there is no significant impact in the medium or long term due to the extremely low quantities of pollutants emitted into the atmosphere and due to the air currents, which contribute to their dispersion in a short time
4. the cumulative impact with the existing installations in the analyzed area is insignificant (even negligible) taking into account the fact that the emissions from the incinerator activity are at totally negligible values
5. the cross-border impact is insignificant to neutral in all respects (direct, indirect, secondary, cumulative, short/medium/long term, temporary, permanent) whereas:

- the amounts of air pollutants emitted from the operation of the incinerator are low and within legal limits
- there are no areas of air pollutant propagation with excesses of the permissible limit values for pollutant concentrations and the nearest boundary point is 3317 m from the flue gas stack of the analyzed incinerator.

With regard to a possible impact on the environment and on the population in the area caused by the possible presence of odours resulting from the incineration activity analyzed, we make the following clarifications:

1. if all internal procedures related to the reception, temporary storage, handling and incineration of the waste analyzed are followed, then no odours will be generated, which would have a significant negative impact on the population
2. where animal waste is to be handled, the rules on its transport from the generator to the incinerator site must be strictly observed, and a cold store must be used for its temporary storage until it is incinerated - in which case no odors will be generated, which would have a significant negative impact on the population

Regarding emission concentration values for different averaging periods and pollutants:

1. organic substances in gaseous or vaporous state, expressed as total organic carbon (COT) for averaging periods:
   - half an hour
   - 24 hours
2. hydrochloric acid (HCl) for averaging periods:
   - half an hour
   - 24 hours
3. hydrofluoric acid (HF) for averaging periods:
   - half an hour
   - 24 hours
4. total powders (TSP) for averaging periods:
   - half an hour
   - 24 hours
5. nitrogen dioxide (NO_2) for averaging periods:
   - half an hour
   - 24 hours

6. sulphur dioxide (SO_2)
   - half an hour
   - 24 hours
7. dioxins and furans
   - 8 hours

are all below the emission peak values (VLEs) of Annex 6, Law 278/2013 both for the situation of incinerator operation with additional air supply and without additional air supply.

All actions/activities to be carried out, both in the construction and in the operation phase, will be characterized, in terms of their impact on environmental factors, by:

- duration of manifestation
  - project implementation period - very short duration
  - period of operation of the investment - short term
- frequency of occurrence
  - project implementation period - only until completion of the investment
  - period of operation of the investment - whenever there is activity on the site according to the profile
- impact reversibility
  - project implementation period - fully reversible
  - investment operating period - fully reversible

Impact on population health across borders

Centralization of data obtained from mathematical modelling of pollutant dispersion in the atmosphere:

CARBON MONOXIDE (CO)

Table 77 - Variation of CO concentration in relation to distance from the emission point

Propagation distances (m)			Concentrations determined by mathematical dispersion modelling (µg/m3)			Human health						Ecosystems			Obs.
						Hourly value (µg/m3)			Daily value (µg/m3)						
8 h	24 h	1 year	8 h	24 h	1 year	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
Bulgaria[46]			**0.1**						10000	7000	5000				<<< VL
Ruse city[47]			**0.1**												<<< VL
	Bulgaria			**0.03**											<<< VL
	Ruse city			**0.03**											<<< VL
		Bulgaria			**0.001**										<<< VL
		Ruse city			**0.001**										<<< VL

NO_2

Table 78 - Variation of NO_2 concentration in relation to distance from the emission point

Propagation distances (m)			Concentrations determined by mathematical dispersion modelling (µg/m3)			Human health						Vegetation			Obs.
						Hourly value[48] (µg/m3)			Annual value (µg/m3)						
1 h	24 h	1 year	1 h	24 h	1 year	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
Bulgaria			**0.4**				200			40					<<< VL
Ruse city			**0.4**												<<< VL
	Bulgaria			**0.03**											<<< VL
	Ruse city			**0.03**											<<< VL
		Bulgaria			**0.001**										<<< VL
		Ruse city			**0.001**										<<< VL

[46] at the border with Bulgaria at a distance of 3317 m
[47] at the border of the residential area of Ruse at a distance of 3856 m
[48] European Environment Agency - Nitrogen dioxide - Annual limit values for the protection of human health

SO_x

Table 79 - Variation of SO concentration in relation to distance from the emission point

Propagation distances (m)			Concentrations determined by mathematical dispersion modelling (µg/m3)			Human health						Vegetation			Obs.
						Hourly value (µg/m3)			Daily value (µg/m3)			Annual value (µg/m3)			
1 h	24 h	1 year	1 h	24 h	1 year	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
Bulgaria			**0.02**			350			125	75	50	20	12	8	< VL
Ruse city			**0.02**												
	Bulgaria			**0.001**											< VL
	Ruse city			**0.001**											
		Bulgaria			**0.00005**										< VL
		Ruse city			**0.00005**										

TSP

Table 80 - Variation of TSP concentration in relation to distance from the emission point

Propagation distances (m)				Concentrations determined by mathematical dispersion modelling (µg/m3)				Human health						Ecosystems			Obs.
								Hourly value (µg/m3)			Daily value (µg/m3)						
1 h	8 h	24 h	1 year	1 h	8 h	24 h	1 year	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
Bulgaria				**0.01**				50	35	25	40	28	20				< VL
Ruse city				**0.01**													
		Bulgaria				**0.0006**											< VL
		Ruse city				**0.0006**											
			Bulgaria				**0.00002**										< VL
			Ruse city				**0.00002**										

HCl

Table 81 - Variation of HCl concentration in relation to distance from emission point

Propagation distances (m)		Concentrations determined by mathematical dispersion modelling (µg/m3)		Human health						Vegetation (µg/m3)			Obs.
				Hourly value (mg/mc)			Annual value (mg/mc)						
30 min.	24 h	30 min.	24 h	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
Bulgaria		**0.03**		1490	74.52	52							<<< VL
Ruse city		**0.03**											<<< VL
	Bulgaria		**0.003**										<<< VL
	Ruse city		**0.003**										<<< VL

According to data from the world scientific literature[49], the following conclusions have been reached after numerous researches:

EFFECTS ON HUMAN

Single exposure

The National Research Council has reviewed the toxicological effects of HCl in humans (NRC 1987, 1991). The reports have concluded that exposure to irritating concentrations of HCl can lead to coughing, pain, inflammation, oedema and flaking in the upper respiratory tract. Acute exposure to high concentrations could cause constriction of the larynx and bronchi and closure of the glottis. Because HCl is extremely irritating to the mucous surfaces of the respiratory tract and to the eyes, HCl has good warning properties.

Henderson and Haggard (1943) summarized information from several sources on the length of time various concentrations of HCl exposure could be tolerated by healthy workers and the effects that might occur (Table D-1). Matt (1889) stated in his doctoral thesis that work is impossible when inhaling air containing HCl in concentrations of 50 to 100 ppm; work is difficult but possible when the air contains concentrations of 10 to 50 ppm; and work is unworkable at 10 ppm. However, the exposure protocol used by Matt (1889) included only two individuals and three exposure concentrations. Each individual was exposed once to HCl at 10 ppm (10 min), 70 ppm (15 min) and 100 ppm (15 min). When exposed to 70 ppm, individuals left the exposure chamber once briefly during the 15-minute period, and when exposed to 100 ppm, they left several times due to acute discomfort. During exposure to high concentrations, individuals experienced coughing, an increase in breathing rate and severe irritation of the throat and respiratory tract. Matt (1889) included in his report a description by another researcher of another volunteer exposed to HCl at 50 ppm for 13 minutes. Heyroth (1963) indicated in an editorial note that, in his opinion, most people can detect HCl in air at 1-5 ppm and that 5-10 ppm is an unpleasant exposure concentration. Elkins (1959) was of the opinion that exposure to HCl at 5 ppm is immediately irritating to the nose and throat, but without long-lasting effects. Sayers et al. (1934) expressed their opinion that prolonged exposure to 1-5 ppm resulted in mild symptoms, exposure to 5-10 ppm for 1 hour was the maximum exposure concentration without serious effects, and 150-200 ppm was dangerous in 30-60 min.

TABLE D-1 Interpretations of Various HCl Exposure Concentrations in the Workplace

HCl Concentration, ppm	Exposure Duration	Physiological Responses	References
1,000-2,000	Brief	Dangerous for even short exposures	Henderson and Haggard 1943
50-100	1 hr	Maximum tolerable concentration	Henderson and Haggard 1943
10-50	A few hr	Maximum tolerable concentration	Henderson and Haggard 1943
35	Unspecified short time	Irritation of throat	Henderson and Haggard 1943
10	Prolonged	Maximum allowable concentration	Henderson and Haggard 1943
1-5	----	Odor threshold	Heyroth 1963

[49] Assessment of Exposure-Response Functions for Rocket-Emission Toxicants. National Research Council (US) Subcommittee on Rocket-Emission Toxicants. Washington (DC): National Academies Press (US); 1998..

PHYSICAL AND CHEMICAL PROPERTIES

CAS No.:	7647-01-0
Molecular formula:	HCl
Molecular weight:	36.47
Chemical name:	Hydrogen chloride
Synonyms:	Muriatic acid, spirits of salt, chlorohydric acid, hydrochloric acid gas
Physical state:	Gas
Boiling point:	-84.9°C
Melting point:	-144.8°C
Vapor density:	1.26 (air = 1.0)
Vapor pressure:	40 mm Hg at 17.8°C
Solubility:	Highly soluble in water, forming hydrochloric acid (82.3 g/100 g of water at 0°C)
Color:	Colorless as a gas
Conversion factors 1 mg/m^3 = 0.671 ppm	1 ppm = 1.49 mg/m^3 at 25°C, 1 atm:

HF

Table 82 - Variation of HF concentration versus distance from emission point

Propagation distances (m)		Concentrations determined by mathematical dispersion modelling (µg/m3)		Human health						Vegetation			Obs.
				Hourly value (µg/m3)			Annual value (µg/m3)						
30 min.	24 h	30 min.	24 h	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
Bulgaria		**0.0001**		36000	20000	800							<<< VL
Ruse city		**0.0001**											<<< VL
	Bulgaria		**0.00002**										<<< VL
	Ruse city		**0.00002**										<<< VL

According to data from the world scientific literature[50], the following conclusions have been reached after numerous researches:

TABLE 3-1 Summary Table of AEGL Values (ppm [mg/m^3])

Classification	10 min	30 min	1 h	4 h	8 h	End Point (Reference)
AEGL-1 (Nondisabling)	1.0 (0.8)	1.0 (0.8)	1.0 (0.8)	1.0 (0.8)	1.0 (0.8)	Threshold, pulmonary inflammation in humans (Lund et al. 1997, 1999)
AEGL-2 (Disabling)	95 (78)	34 (28)	24 (20)	12 (9.8)	12 (9.8)	NOAEL for lung effects in cannulated rats (Dalbey 1996; Dalbey et al. 1998a);[a] sensory irritation in dogs (Rosenholtz et al. 1963)[b]
AEGL-3 (Lethal)	170 (139)	62 (51)	44 (36)	22 (18)	22 (18)	Lethality threshold in cannulated rats (Dalbey 1996; Dalbey et al. 1998a);[c] lethality threshold in mice (Wohlslagel et al. 1976)[d]

a 10-min AEGL-2 value

b 30-min and 1-, 4-, and 8-h AEGL-2 values

c 10-min AEGL-3 value

d 30-min and 1-, 4-, and 8-h AEGL-3 values

Abbreviations: mg/m^3, milligrams per cubic meter; ppm, parts per million

TABLE 3–2 Chemical and Physical Data for Hydrogen Fluoride

Parameter	Value	Reference
Synonyms	Hydrofluoric acid gas, anhydrous hydrofluoric acid	Budavari et al. 1996
Molecular formula	HF	Budavari et al. 1996
Molecular weight	20.01	Budavari et al. 1996
CAS Registry Number	7664–39–3	Budavari et al. 1996
Physical state	Gas	Budavari et al. 1996
Color	Colorless	Budavari et al. 1996
Solubility in water	Miscible in all proportions	Perry et al. 1994
Vapor pressure	760 mm Hg at 20°C	ACGIH 2002
Density (water=1)	1.27 at 34°C	Perry et al. 1994
Melting point	−87.7°C	Perry et al. 1994
Flammability	Not flammable	Weiss 1980
Boiling point	19.5°C	Perry et al. 1994
Conversion factors	1 ppm=0.82 mg/m^3 1 mg/m^3=1.22 ppm	ACGIH 2002

[50] Acute Exposure Guideline Levels for Selected Airborne Chemicals: Volume 4: – National Research Council (US) Committee on Toxicology Subcommittee on Acute Exposure Guideline Levels. Washington (DC): National Academies Press (US); 2004.

HUMAN TOXICITY DATA

2.1. Acute lethality

No data have been located on human deaths from inhalation exposure to HF alone. However, several studies indicate that people have died from accidental exposure to hydrofluoric acid (Kleinfeld 1965; Tepperman 1980; Braun et al. 1984; Mayer and Gross 1985; Chan et al. 1987; Chela et al. 1989; ATSDR 1993). These accidents involved acute inhalation of HF in combination with dermal exposure involving severe skin damage. Deaths were attributed to pulmonary oedema and cardiac arrhythmias, the latter being the result of acidosis due to hypocalcaemia and hypomagnesaemia pronounced following dermal fluoride absorption. Doses or exposure levels could not be determined.

2.2. Non-lethal toxicity

Ronzani (1909) and Machle et al. (1934) cites the first reports in which an HF concentration of 0.004% (40 ppm) was used in the treatment of tuberculosis. Exposure times were not specified. The sharp and irritating odour of HF is perceptible at 0.02-0.13 ppm (Sadilova et al. 1965; Perry et al. 1994).

COT

Table 83 - Variation of TOC concentration in relation to distance from emission point

Propagation distances (m)		Concentrations determined by mathematical dispersion modelling (µg/m3)		Human health						Vegetation			Obs.
				Hourly value (µg/m3)			Annual value (µg/m3)						
30 min.	24 h	30 min.	24 h	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
Bulgaria		**0.03**											
Ruse city		**0.03**											
	Bulgaria		**0.001**										
	Ruse city		**0.001**										

DIOXINS AND FURANS

Table 84 - Variation of PCDD & PCDF concentration in relation to distance from emission point **(values in µg/mc x 10^{-6})**

Propagation distances (m)				Concentrations determined by mathematical dispersion modelling (µg/mc x 10^{-6})				Human health						Ecosystems			Obs.
								Value of 8 hours (pg I.TEQ/Nmc)			Daily value (pg I.TEQ/Nmc)						
1 h	8 h	24 h	1 year	1 h	8 h	24 h	1 year	peak values[51]	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
Bulgaria				**0.0003**				0.3									< VL
Ruse city				**0.0003**													< VL
	Bulgaria				**0.00009**												< VL
	Ruse city				**0.00007**												< VL
		Bulgaria				**0.00004**											< VL
		Ruse city				**0.00003**											< VL
			Bulgaria				-										< VL
			Ruse city				-										< VL

[51] there is no worldwide limit value for the concentration of dioxins and furans in immission, but in expert studies a value of 0.3 pg I.TEQ/Nmc - (U.S. Environmental Protection Agency) for an averaging period of 8 hours

Table 85 - Variation of PCDD & PCDF concentration in relation to distance from the emission point (values in pg I.TEQ/Nmc)

Propagation distances (m)				Concentrations determined by mathematical dispersion modelling (pg I.TEQ/Nmc)				Human health						Ecosystems			Obs.
								Hourly value (pg I.TEQ/Nmc)			Daily value (pg I.TEQ/Nmc)						
1 h	8 h	24 h	1 year	1 h	8 h	24 h	1 year	peak values[52]	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
Bulgaria				**0.03**				0.3									< VL
Ruse city				**0.03**													< VL
	Bulgaria				**0.009**												< VL
	Ruse city				**0.007**												< VL
		Bulgaria				**0.004**											< VL
		Ruse city				**0.003**											< VL
			Bulgaria				-										< VL
			Ruse city				-										< VL

The centralization of the above information is presented in tabular form:

Table 86: concentration values in immission at Ruse city boundary

Pollutant	mediation period (µg/m3)			lower threshold (µg/m3)			upper threshold (µg/m3)			peak values (µg/m3)		
	1 h	8 h	24 h	1 h	8 h	24 h	1 h	8 h	24 h	1 h	8 h	24 h
CO			0.03			5000						
NO_2	0.4											
SO_X	0.02		0.001			50	200			350		
TSP	0.1		0.0006	25		20						
HCl	0.03			52×10^3								
HF	0.0001			800								
dioxins and furans **values expressed in (pg I.TEQ/Nmc)**	0.007									0.3		

[52] there is no worldwide limit value for the concentration of dioxins and furans in immission, but in expert studies a value of 0.3 pg I.TEQ/Nmc - (U.S. Environmental Protection Agency) for an averaging period of 8 hours

The conclusions of the information presented above on the transboundary impact of incinerator operation on the human health of the inhabitants of the city of Ruse are as follows:

1. CO - the values recorded for concentration in immission at the Romanian boundary of Ruse are well below the lower threshold values for human health. The impact of the operation of the incinerator on the health of the inhabitants of the city of Ruse will be neutral.
2. NO_2 – the values recorded for concentration in immission at the Romanian boundary of Ruse are well below the lower threshold values for human health. The impact of the operation of the incinerator on the health of the inhabitants of the city of Ruse will be neutral.
3. SO_X –the values recorded for concentration in immission at the Romanian boundary of Ruse are well below the limit values for the 1 h averaging period and the lower threshold values for the 24 h averaging period (related to human health). The impact of the operation of the incinerator on the health of the inhabitants of the city of Ruse will be neutral.
4. TSP –the values recorded for concentration in immission at the Romanian boundary of Ruse are well below the limit values for the 1 h averaging period and the lower threshold values for the 24 h averaging period (related to human health). The impact of the operation of the incinerator on the health of the inhabitants of the city of Ruse will be neutral.
5. HCl – the values recorded for concentration in immission at the Romanian boundary of Ruse are well below the lower threshold values for human health. The impact of the operation of the incinerator on the health of the inhabitants of the city of Ruse will be neutral.
6. HF - the values recorded for concentration in immission at the Romanian boundary of Ruse are well below the lower threshold values for human health. The impact of the operation of the incinerator on the health of the inhabitants of the city of Ruse will be neutral.
7. dioxins and furans - the values recorded for concentration in immission at the Romanian boundary of Ruse are well below the limit values for human health. The impact of the operation of the incinerator on the health of the inhabitants of the city of Ruse will be neutral.

The impact on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;

From the incineration activity, the amount of greenhouse gases that could result in one year, if the incinerator were operated at full capacity and maximum time, was calculated to be 211 t CO_2/year. This amount is extremely small and cannot cause climate impact.

Impact on noise and vibration - both during the implementation of the project works and during operation, a slight negative effect is expected from the noise and vibration generated by the vehicles that will service these activities. This impact will occur intermittently, directly and over short periods. During these periods, it can occur cumulatively with the impact generated by vehicles passing through the area.

Impact on landscape and visual environment - a positive, permanent, long-lasting impact is expected.

Impact on historical and cultural heritage - neutral impact expected

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7. DESCRIPTION OR EVIDENCE OF FORECASTING METHODS USED TO IDENTIFY AND ASSESS SIGNIFICANT ENVIRONMENTAL EFFECTS

The following were used to assess the environmental impact of the project:

- the method of assessing the magnitude of the environmental impact based on indicators capable of reflecting the general state of the environmental factors analyzed
- pollution index method
- quality index method
- Rojanschi method[53] based on the determination of the global pollution index IPG

The method of assessing the magnitude ofenvironmental impact based on indicators that reflect the overall state of the environmental factors under analysis goes through several stages:

- Determination of indicators capable of reflecting the general state of the environmental factors analyzed.
- The indicators for each environmental factor are placed on a goodness scale with scores expressing how close or far they are from ideal.
- To simulate the synergistic effect of the pollutants, a diagram is constructed with the goodness scales obtained.

8. DESCRIPTION OF THE MEASURES ENVISAGED TO AVOID, PREVENT, REDUCE OR OFFSET ANY IDENTIFIED SIGNIFICANT ADVERSE ENVIRONMENTAL EFFECTS

As shown in the previous sub-chapters, there will be no significant environmental impact during both the implementation and operation of the investment.

However, recommendations will be made to avoid situations that could have a significant impact on some or all environmental factors. Compliance with the provisions of the regulations (opinions and agreements issued by the competent authorities in the field of environmental protection and water management) would prevent such situations from arising.

A. Air environmental factor

Project implementation phase

At this stage, cars and machinery equipped with engines with pollution standards from EURO 4 onwards will be used.

To limit powder emissions, the tracks on the site will be wetted during very dry periods.

Project operation phase

At this stage, vehicles equipped with engines with pollution standards from EURO 5 onwards will be used for supply, waste removal, etc.

The incinerator burners are state-of-the-art with low NO_x emissions.

B. noise and vibration environmental factors

Noise protection is regulated by the "Noise Protection Regulation", indicative 1, approved by the Ministry of Transport, Construction and Tourism in 2003. In the specific project situation, noise protection is determined according to the noise curve map, drawn up according to the technical specifications of the equipment by the German specialist company DEUTSCHE WINGUARD. In the above regulation the following are mentioned:

[53] Illustrative method for global assessment of the state of environmental quality (Rojanschi 1997 and de Popa 2005)

The permissible limits of Lech equivalent noise levels outside buildings at a distance of 2.00 m from the façade and a height of 1.30 m above the ground or the level considered for protected buildings are given in the table below:

Table 87 - Permissible noise limits near protected buildings

Item no.	Protected building	Permissible limit of noise level equivalent dB (A)	Order number of the Cz curve appropriate
1.	Housing, hotels, hostels, guest houses	55	50
2.	Hospitals, polyclinics, dispensaries	45	40
3.	Schools	55	50
4.	Kindergartens, crèches	50	45
5.	Office buildings	65	60

Noise sources are represented by:

- machinery carrying out construction works
- means of transport participating in the construction works
- means of transporting waste for incineration
- incinerator during operation

Noise and vibration levels produced

No noise and vibration level determinations have been carried out; we can estimate that the noise level will not exceed, at the boundary of the property, the maximum value allowed by the Order of the Minister of Health no. 119/2014 approving the hygiene and public health norms concerning the living environment of the population.

C. soil environmental factor

The whole activity will be carried out on the existing concrete platforms on the site under consideration, which is a good protection to avoid soil pollution.

Possible sources of soil and subsoil pollution

Possible sources of soil pollution are:

- possible accidental spillage of fuels or lubricants from vehicles and machinery servicing the construction activity and then from specific activities during the incinerator operation phase - these spills are classified as accidental pollution
- possible accidental spillage of fuels or lubricants from the vehicles and machinery servicing the incinerator operation

Bearing in mind that the waste to be brought to the site for incineration is:

- transported in containers or bins
- by their nature these wastes do not have a liquid composition with the potential to pollute the soil
- they shall only be handled under controlled conditions by well-trained personnel
- the entire waste handling process will be carried out exclusively on concrete platforms

this waste will not be a soil pollutant.

Measures, facilities and arrangements for soil and subsoil protection

The following measures have been foreseen to avoid soil pollution:

- the functionality of the thermal engines of the vehicles used for construction work shall be checked in due time
- no fuel and oil depots are set up in places other than those equipped in accordance with legal requirements;
- maintenance and repair works on machinery and means of transport shall be carried out only in specially designated places;

- no washing of machinery and vehicles shall be carried out on the premises, with the exception of washing for the sanitation of means of transport of non-hazardous animal waste;
- the supply of diesel and lubricants to machinery is carried out under all conditions to avoid accidental losses and to protect the environment in specially equipped places - fuel distribution stations;
- all machinery and vehicles used in the construction work and then in the incineration work run on designated roads and are parked only on concrete platforms
- waste for incineration shall be temporarily stored only in special containers in specially designated areas
- the waste from the incineration process is collected in special containers in an appropriate area.

D. water environmental factor - only groundwater is referred to as there is no surface water in the area.

Causes that may lead to potential pollution of surface water as well as groundwater, through infiltration of pollutants into the groundwater, during the implementation of the project activity as well as during the operational phase may be related to:

- accidents in the normal operation of machinery used in construction work (crane, fork-lift truck) leading to possible accidental loss of lubricants and/or fuels
- possible accidental damage to the diesel tanks of the vehicles serving the activity
- possible accidental loss of lubricants by machinery or vehicles servicing the activity

Even in the unlikely event of having such situations considering the issues:

- all work on the site is carried out only on concrete platforms
- there are no surface waters nearby. The nearest surface water is Lake Giurgiu at a distance of 1037 m

it is virtually impossible for surface water pollution from the activities of the company to occur.

However, there remains a very low probability of accidental groundwater pollution if preventive measures are not taken.

In order to avoid accidental pollution of surface water and groundwater it is recommended:

- the functionality of the engines and other equipment shall be checked in good time
- the fuel tanks of the vehicles serving the activity shall be checked at all times
- a ban on the development of fuel and oil depots in places other than those that already exist and meet environmental protection standards;
- maintenance and repair work on machinery and means of transport shall be carried out only in specially designated areas outside the construction area;
- the washing of machinery on the premises is prohibited except for disinfection washing
- the supply of diesel oil and lubricants will be carried out in such a way as to avoid accidental losses and to protect the environment;
- ➢ any pollution of surface water or groundwater, regardless of the causes of its pollution, shall be immediately reported to Buzau Basin Administration - Giurgiu Water Management System and Giurgiu Environmental Guard.

The trans-boundary nature of the impact

Air environmental factor

In order to make a correct and complete analysis of a possible trans-boundary impact of the operation of the incinerator at the location under consideration, an analysis of:

1. the activities of companies operating in Giurgiu area and having a significant impact on air quality, i.e. those companies holding IPPC permits.

The main economic operators regulated by environmental permits[54] are:

- SCUT Giurgiu SA (now SC Global Energy Production SA) - thermoelectric power plant is located in the western part of Giurgiu. To reduce its impact on air quality, the plant was equipped with low NO_X burners and the fuel was changed from conventional coal to natural gas. Emission quantities, mainly SOx, NO_x, CO and PM_{10}, have decreased significantly year on year due to reduced operating capacity.
- SC Poll Chimic SRL is located in the eastern part of Giurgiu. Its main activity is the manufacture of other basic chemicals. Emissions from this economic operator are those from the thermal power plant that provides the thermal agent for this location and from the manufacturing process. The most important pollutants emitted are: SO_2 , NO_x, CO and NMVOC.
- SC UCO Tesatura SRL is located in the eastern industrial area of Giurgiu and its main activity is the processing of spun cotton fibers and the production of fabrics and textiles. The unit has ceased operations.

2. the ratio of emissions generated by the activity of incinerator to emissions generated by the activities of other companies located around Giurgiu municipality.

- greenhouse gas emissions - the amount of greenhouse gas emissions from incineration activity that could result in one year, if the incinerator were operated at full capacity and maximum time, was calculated to be 211 t CO_2/year
- the amounts of greenhouse gases resulting from other activities in the area (SC Global Energy Production SA - as the most significant economic agent in terms of combustion emissions) were:
  - 2017 – 5287 t CO_2
  - 2018 – 6244 t CO_2
  - 2019 – 5233 t CO_2
- the ratio between the emissions generated by the incinerator activity and the emissions generated by the activities of the other companies located around Giurgiu municipality - only the flue gas emissions resulting from the activity of SC Global Energy Production SA will be taken into account and will be related to the amount of flue gas emissions estimated to result from the activity of SC Friendly Waste Romania SRL in one year (i.e. 211 t CO_2/year)
  - 2017 – 211 / 5287 t CO_2 = 3.99%
  - 2018 – 211 / 6244 t CO_2 = 3.38%
  - 2019 – 211 / 5233 t CO_2 = 4.03%

  It is noted that this ratio is insignificant and that the share of greenhouse gas emissions from the incinerator activity is not likely to cause significant negative effects on the environmental factor air and climate in the area.

3. the prevailing direction of the air (wind) currents and their speed. For such an analysis, data collected for the years 2010 to 2015 were used [55]

[54] "Revised Master Plan for Water and Sewerage Infrastructure in Giurgiu County" - revision 2
[55] Air Quality Report 2016

Table 88 - Average annual wind and calm frequency (%) at Giurgiu weather station

ANII	DIRECTIA								
	N	NE	E	SE	S	SV	V	NV	CALM
2010	6,32	23,3	10,94	2,25	7,05	22,24	16,82	3,11	7,98
2011	5,7	21,31	14,7	2,67	5,57	21,27	15,48	4,17	9,13
2012	4,58	19,18	18	3,07	7,76	20,62	15,41	3,32	7,5
2013	3,8	17,7	19,8	3,55	5,05	16,5	22,82	3,39	7,47
2017	4,02	19,03	24,71	4,1	3,8	14,32	18,2	4,14	7,75
2015	3,42	12,8	24,5	2,48	3,78	16,28	23,34	3,83	9,57

Table 89 - Average monthly and annual wind speed (m/s) at Giurgiu weather station

ANII	LUNILE												ANUALA
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
2010	2,4	2,7	3,1	2,3	1,8	1,6	1,3	1,5	2,2	2,4	2,2	2,0	**2,1**
2011	1,6	3,0	2,6	2,5	1,7	1,4	1,6	1,5	1,7	1,9	1,6	1,9	**1,9**
2012	2,7	3,1	2,3	2,1	1,8	1,6	2,1	1,7	1,9	1,9	1,9	2,5	**2,1**
2013	2,2	3,1	2,9	2,3	1,9	1,4	1,4	1,7	2,0	1,6	2,6	1,6	**2,1**
2017	2,4	2,1	2,8	2,7	1,4	1,5	1,5	1,6	1,8	1,8	1,8	2,7	**2,0**
2015	2,3	2,5	2,7	2,1	1,5	1,4	1,3	1,5	1,5	1,6	2,2	2,0	**1,9**

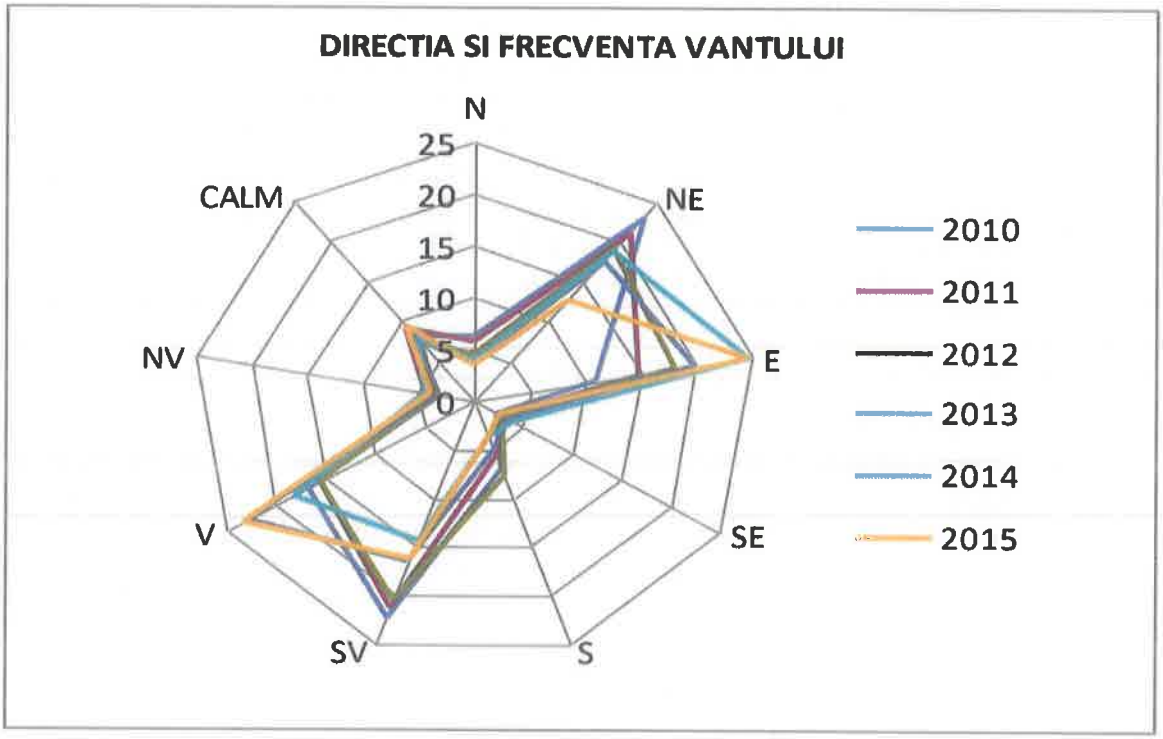

Figure 84 - Diagram representing wind direction and frequency

From the analysis of all the information presented it can be concluded that the transboundary impact on the air environment factor of the incinerator activity is neutral on all levels (direct, indirect, secondary, cumulative, short/medium/long term, temporary, permanent) whereas:

- the amounts of air pollutants emitted from the operation of the incinerator are low and within legal limits

- there are no areas with excesses of pollutant concentrations and the nearest boundary point is 3317 m from the flue gas stack of the analyzed incinerator
- the wind direction towards the border with Bulgaria (from the N and NE) is for a period of approx. 23.4% of the year but the propagation of pollutants towards the border is non-existent because, according to mathematical modelling, the concentrations in the immission are very low and below the VLA levels in the vicinity of the emission point (incinerator stack)

Water environmental factor

The wastewater from the site under consideration, which reaches the industrial sewerage network, will comply with the provisions of GD 188/2002 modified and completed by GD 325/2005, Annex 3, Table 1 (NTPA 001/2005). After treatment, the water is discharged into the industrial sewage network (the portion of the network managed by SC Delta Gas SRL) from where it is discharged into the Danube River.

The concentration of pollutants in the wastewater resulting from and discharged from the analyzed site is within the maximum values regulated by GD 325/2005, Annex 2, Table 1 (NTPA 01/2005).

The resulting wastewater flow rate at the site is 2.06 m^3/day= 0.0858 m^3/hour= 0.000023 m^3/s.

As regards the cumulative impact of the wastewater resulting from the site and treated in the treatment plant to be installed (its effluent quality will be within the maximum values regulated by GD 325/2005, Annex 2, Table 1 (NTPA 01/2005) with the impact generated by the operation of the Giurgiu municipality treatment plant, it will be neutral.

The quality of the receiver (Danube river), whose average multi-annual flow[56] is 6040 m^3/s will not be affected by the wastewater resulting from the treatment of the water from the analyzed site because its flow is more than insignificant (0.00012 m3/swastewater compared to the average flow of the Danube river of 6040 m3/s) and the concentrations of pollutants when discharged into the outfall are within the legal limits (NTPA 001/2005) being efficiently treated in the treatment plant of Giurgiu municipality.

Bearing in mind the following:

- the average annual flow of the Danube River is 6040 m^3/s
- the flow of wastewater from the analyzed site and treated in its own treatment plant is much lower than the wastewater discharge from Giurgiu municipality treatment plant before discharge into the natural receiver (Danube river), i.e. 0,00012 m^3/s and is more than insignificant compared to the average annual flow of the river
- the dilution effect of the water discharged into the Danube River is instantaneously analyzed by the ratio of the resulting wastewater flow at the analyzed site (0.000023 m^3/s) to the average annual flow of the Danube River (6040 m^3/s)

there is no question of cross-border impact.

Soil, subsoil and biodiversity environmental factors

No cross-border impact is anticipated as a result of the project activity to be implemented.

Cumulative impact at the border with Bulgaria

The project is located on a former industrial site where no polluting activities are currently carried out, with a significant negative impact on the air environment.

[56] Flood Risk Management Plan - Danube River

As regards the level of air emissions generated by the operation of the incinerator and the concentration of pollutants in the immission, it has been shown that they are well below the maximum permissible emission values or below the limit values for concentrations in the immission.

Practically at the site boundary the values determined for each pollutant for concentrations in immission are well below the limit values:

CARBON MONOXIDE (CO)

Table 90 - Variation of CO concentration in relation to distance from the emission point

Propagation distances (m)			Concentrations determined by mathematical dispersion modelling (µg/m3)			Human health						Ecosystems			Obs.
						Hourly value (µg/m3)			Daily value (µg/m3)						
8 h	24 h	1 year	8 h	24 h	1 year	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
900			0.4						10000	7000	5000				< VL
	1380			0.1											< VL
		760			0.02										< VL

NO_2

Table 91 - Variation of NOx concentration with distance from the emission point

Propagation distances (m)			Concentrations determined by mathematical dispersion modelling (µg/m3)			Human health						Vegetation			Obs.
						Hourly value (µg/m3)			Annual value (µg/m3)						
1 h	24 h	1 year	1 h	24 h	1 year	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
400			1			200	140	100	40	32	26	30	24	19.5	< VL
	890			0.1											< VL
		960			0.01										< VL

SO_x

Table 92 - Variation of SO concentration in relation to distance from the emission point

Propagation distances (m)			Concentrations determined by mathematical dispersion modelling (µg/m3)			Human health						Vegetation			Obs.
						Hourly value (µg/m3)			Daily value (µg/m3)			Annual value (µg/m3)			
1 h	24 h	1 year	1 h	24 h	1 year	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
500			0.04			350			125	75	50	20	12	8	< VL
	350			0.005											< VL
		800			0.001										< VL

TSP

Table 93 - Variation of TSP concentration in relation to distance from the emission point

Propagation distances (m)				Concentrations determined by mathematical dispersion modelling (µg/m3)				Human health						Ecosystems			Obs.
								Hourly value (µg/m3)			Daily value (µg/m3)						
1 h	8 h	24 h	1 year	1 h	8 h	24 h	1 year	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
605				0.02				50	35	25	40	28	20				< VL
		875				0.002											< VL
			980				0.0004										< VL

HCl

Table 94 - Variation of HCl concentration in relation to distance from emission point

Propagation distances (m)		Concentrations determined by mathematical dispersion modelling (µg/m3)		Human health						Vegetation (µg/m3)			Obs.
				Hourly value (µg/m3)			Annual value (µg/m3)						
30 min.	24 h	30 min.	24 h	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
400		0.1		1490	74.52	52							
	775		0.01										

HF

Table 95 - Variation of HF concentration versus distance from emission point

Propagation distances (m)		Concentrations determined by mathematical dispersion modelling (µg/m3)		Human health						Vegetation			Obs.
				Hourly value (µg/m3)			Annual value (µg/m3)						
30 min.	24 h	30 min.	24 h	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
1630		0.0006		36000	20000	800							
	690		0.00008										

COT

Table 96 - Variation of TOC concentration in relation to distance from emission point

Propagation distances (m)		Concentrations determined by mathematical dispersion modelling (µg/m3)		Human health						Vegetation			Obs.
				Hourly value (µg/m3)			Annual value (µg/m3)						
30 min.	24 h	30 min.	24 h	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
1380		0.07											
	715		0.008										

DIOXINS AND FURANS

Table 97 - Variation of PCDD & PCDF concentration in relation to distance from emission point (values in µg/mc x 10--6)

Propagation distances (m)				Concentrations determined by mathematical dispersion modelling (µg/mc x 10^{-6})				Human health						Ecosystems			Obs.
								Value of 8 hours (pg I.TEQ/Nmc)			Daily value (pg I.TEQ/Nmc)						
1 h	8 h	24 h	1 year	1 h	8 h	24 h	1 year	peak values[57]	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
840				0.0008				0.3									< VL
	1100				0.0002												< VL
	5030				0.00005												< VL
		900				0.00009											< VL
			1680				0.00001										< VL

Table 98 - Variation of PCDD & PCDF concentration in relation to distance from the emission point (values in pg I.TEQ/Nmc)

Propagation distances (m)				Concentrations determined by mathematical dispersion modelling (pg I.TEQ/Nmc)				Human health						Ecosystems			Obs.
								Hourly value (pg I.TEQ/Nmc)			Daily value (pg I.TEQ/Nmc)						
1 h	8 h	24 h	1 year	1 h	8 h	24 h	1 year	peak values[58]	upper threshold	lower threshold	peak values	upper threshold	lower threshold	peak values	upper threshold	lower threshold	
840				0.08				0.3									< VL
	1100				0, 02												< VL
		900				0.009											< VL
			1680				0.001										< VL

[57] there is no worldwide limit value for the concentration of dioxins and furans in immission, but in expert studies a value of 0.3 pg I.TEQ/Nmc - (U.S. Environmental Protection Agency) for an averaging period of 8 hours

[58] there is no worldwide limit value for the concentration of dioxins and furans in immission, but in expert studies a value of 0.3 pg I.TEQ/Nmc - (U.S. Environmental Protection Agency) for an averaging period of 8 hours

According to the above results and according to the evaluation matrices and charts, based on the goodness-of-fit scores, of the impact generated by the operation of the incinerator at the border with Bulgaria we have the following conclusions:

1. The environment is affected within acceptable limits
2. The impact is low

9. DESCRIPTION OF ANY PROPOSED FOLLOW-UP MEASURES

Facilities and measures foreseen for the control of emissions of pollutants into the environment

The facilities of the incinerator for controlling emissions of pollutants into the environment are:

- secondary combustion chamber - in this chamber the gases resulting from the incineration of waste in combustion chamber 1 are burned at temperatures of 1100°C which ensures the total removal of any pollutants from the flue gas (except for normal flue gas compounds - CO, CO_2, NO_x, SO_2, powders)
- automated temperature monitoring and control system in the 2 combustion chambers
- flue gas scrubbing and filtering system after leaving the secondary combustion chamber
- flue gas exhaust stack

As this incinerator will incinerate both non-hazardous waste, animal waste and medical waste, automated systems will be installed to monitor flue gas parameters and compounds.

Facilities and measures foreseen to comply with the emission monitoring requirements of applicable best available technique conclusions

According to the best available applicable techniques the emission monitoring measures to be implemented in the project under review are:

- the incinerator will be equipped with a monitoring system for a minimum of 13 parameters
  - $O2_2$ level: measures the range 0 - 25%
  - CO level: measures the range 0 - 2000 ppm
  - NO_x level: measures the range 0 - 1100 ppm as follows:
    - NO - range 0 - 100 ppm
    - NO_2 – range 0 - 1000 ppm
  - TOC level: measures the range 0 - 900 ppm
  - SO_2 level: measures the range 0 - 1000 ppm
  - HCl level: measures the range 0 - 1000 ppm
  - HF level: measures the range 0 - 10 ppm
  - humidity level: measures the range 0 - 90%
  - powder level
  - flue gas pressure at the filter outlet
  - flue gas temperature at the filter outlet
- interpretation and recording of sensor information, consisting of analyzers (transducers), process computer and LCD display

10. A DESCRIPTION OF THE EXPECTED SIGNIFICANT ADVERSE ENVIRONMENTAL EFFECTS OF THE PROJECT RESULTING FROM THE VULNERABILITY OF PROJECT TO MAJOR ACCIDENT AND/OR DISASTER RISKS RELEVANT TO THE PROJECT IN QUESTION

Disasters are a permanent threat to sustainable development and cause numerous human casualties and material losses every year. At the same time, the beginning of this millennium is characterized by an increasing impact of human activities on the Earth. For the period 1980 to 2000, it is estimated that 75% of the world population has been affected at least once by a disaster (earthquake, tropical cyclone, flood, drought, etc.).

Disaster management is the totality of policies, administrative decisions and operational activities that are related to the various stages of disasters at all levels.

A hazard is a threatening event and is the probability of a potential harmful factor occurring in a given period of time that is harmful to humans, their products and the environment. So, hazard is a natural or man-made phenomenon harmful to man, the consequences of which are due to exceeding the safety measures that any society imposes on itself.

Disaster - a hazard is considered a disaster if there are at least ten fatalities or 50 people injured and property losses of more than $1 million.

Risk is the likely level of loss of life, injury, damage to property and economic activity caused by a particular natural phenomenon or group of phenomena in a particular place and time. According to the Encyclopaedic Dictionary (1978, 1999), risk is a possible danger, the probability of facing danger and/or suffering harm.

Vulnerability is the extent to which a system can be affected by the impact of a hazard and encompasses the totality of physical, social, economic and environmental conditions that increase the susceptibility of that system. Vulnerability highlights the extent to which people and their assets are exposed to various hazards and is expressed on a scale from 0 to 1, with 1 expressing the total destruction of assets and the total loss of life in the related area. Vulnerability differs according to the way the population is equipped and prepared.

Resilience is the totality of forces and resources with which society can cope with a hazard by managing to reduce the level of risk through mitigation. Resilience increases when the sustainable development of the region is ensured, preventive measures are taken and systems for warning the population are organized.

Emergency (extreme situation) is another term relatively similar to disaster. A disaster can be seen as a particular type of emergency. "Disaster" suggests a long period of time and reaching some level of urgency.

Accident is a fortuitous, unforeseeable event that interrupts the normal course of events (causing damage, injury, maiming or even death).

For a correct and complete analysis of the possibility of accidents occurring in the perimeter of the incinerator site, several works developed for this site were analyzed, namely:

- plans
- company organisation chart
- fire response plan
- security plan for the period of operation
- accidental pollution prevention and response plan
- safety data sheets for substances/mixtures to be present on the site (prepared in accordance with the REACH Regulation and classification in accordance with the CLP Regulation)
- authorizations and approvals applicable to the activity obtained to date
- potential situations where accident risks may occur

- mathematical modelling was carried out with specialized software for different types of scenarios, calculating or estimating probabilities for each type of analyzed scenario

The project proposed by Friendly Waste Romania SRL does not fall under the provisions of the SEVESO Directive transposed into national legislation by Law no. 59/2016 on the control of major accident hazards involving hazardous substances.

No Major Accident Prevention Policy and/or Safety Report required.

According to the Law no. 575/2001 on the National Spatial Planning - Section V - Natural risk areas are geographically delimited areas within which there is a potential for the occurrence of destructive natural phenomena, which may affect the population, human activities, the natural and built environment and cause damage and human casualties. The following are covered by the normative deed: natural risk areas caused by earthquakes, floods and landslides.

Giurgiu Municipality is included in the above-mentioned normative deed, respectively:

- Annex 3 - URBAN ADMINISTRATIVE - TERRITORIAL UNITS located in areas for which the seismic intensity, equated on the basis of the calculation parameters for the seismic zoning of the territory of Romania, is at least VII (expressed in MSK degrees) - heading 88

Giurgiu Municipality is not found in the above-mentioned normative deed, respectively:

- Annex 5. Administrative-territorial units affected by floods
- Annex 7. Administrative-territorial units affected by landslides.

11. BAT

We will present the comparison of the installation to be carried out with the BAT provisions. First of all, it should be noted that a new plant will be used, equipped with the latest world-class technology in terms of incineration efficiency and low emissions of pollutants into the atmosphere.

At the same time we would like to point out that this is not an installation falling under the provisions of Directive 2008/1/EC of the European Parliament and of the Council of January 15th, 2008 concerning integrated pollution prevention and control.

At the same time, we would like to point out that these BAT provisions will apply during the permitting and operation of the installation.

S.C. FRIENDLY WASTE ROMANIA S.R.L. will apply a number of techniques that are considered BAT, as set out in the Reference Document "COMMISSION IMPLEMENTING DECISION (EU) 2019/2010 of 12 November 2019 establishing BAT conclusions pursuant to Directive 2010/75/EU of the European Parliament and of the Council for the incineration of waste", which refers to the following activities listed in Annex I to Directive 2010/75/EU **(although S.C. FRIENDLY WASTE ROMANIA S.R.L. will not be an IPPC facility)**:

5.2. Disposal or recovery of waste in waste incineration plants:

(a) for non-hazardous waste with a capacity exceeding 3 tonnes per hour;

(b) for hazardous waste with a capacity exceeding 10 tonnes per day.

for the operation of equipment, incineration plants and for the control of emissions of pollutants into the environment. The incinerator to be used by **S.C. FRIENDLY WASTE ROMANIA S.R.L. is new, equipped according to the latest international standards in terms of pollutant emission reduction, has a high degree of reliability and safety in operation, in accordance with the best available techniques in the field (BAT).**

S.C. FRIENDLY WASTE ROMANIA S.R.L. will apply procedures and technologies in full compliance with BAT requirements as follows:

1. Environmental management systems

The provisions of BAT 1 - development and implementation of an Environmental Management System (EMS) with all of the following features will apply:

- commitment, leadership and accountability from management, including senior management, to implement an effective EMS - company management is actively and continuously involved in ensuring that all employees implement the provisions of the EMS
- analysis to include determining the context of the organisation, identifying stakeholder needs and expectations, identifying the characteristics of the facility that are associated with possible risks to the environment (or human health), and the applicable legal requirements in relation to the environment - an analysis has been carried out and all of these issues have been identified and how all of these criteria have been met
- development of an environmental policy that includes continuous improvement of the environmental performance of the installation - criterion met
- setting targets and performance indicators for significant environmental aspects, including ensuring compliance with applicable legal requirements - criterion met
- planning and implementation of necessary procedures and actions (including corrective and preventive actions where necessary) to achieve environmental objectives and avoid environmental risks - criterion met
- determination of structures, roles and responsibilities related to environmental issues and objectives and provision of the necessary financial and human resources - criterion met
- ensuring that staff whose work may affect the environmental performance of the installation are competent and aware of their role (e.g. through provision of information and training) - criterion met
- internal and external communication - criterion met
- encouraging employee involvement in good environmental management practices - criterion met
- development and maintenance of a management manual and written procedures for the control of activities with significant environmental impacts and relevant records - criterion met
- effective operational planning and process control - criterion met
- implementation of appropriate maintenance programmes - criterion met
- emergency preparedness and response protocols, including prevention and/or mitigation of negative (environmental) impacts of emergencies - criterion met. The company will draw up **(in the operational phase)**:
  - Accidental pollution prevention and response plan
  - procedures for fire prevention and extinguishing
- when (re-)designing a (new) installation or part of it, consideration of its environmental effects over its lifetime, including construction, maintenance, operation and decommissioning - criterion met. For each expansion of activity and/or increase in incineration capacity will be developed:
  - environmental impact study and environmental impact study report
  - mathematical modelling study of pollutant dispersion in the atmosphere
  - decommissioning and/or shutdown programmes
- implementation of a monitoring and measurement programme - criterion to be met. The company will have a monitoring and measurement programme established by the

environmental permit to be issued. This program will be updated each time important changes occur in the installation.

- regular sectoral benchmarking - this criterion will be met
- periodic independent internal audit (to the extent possible) and periodic independent external audit to assess environmental performance and to determine whether or not the EMS is in compliance with planned measures and has been properly implemented and maintained - to be met internally by management and externally through the body that will grant ISO 14001 certification
- assessment of the causes of non-conformities, implementation of corrective actions in response to non-conformities, review of the effectiveness of corrective actions and determination of the existence or likelihood of occurrence of similar non-conformities; EN Official Gazette of the European Union L 312/62 3.12.2019 - criterion to be met
- regular review by senior management of the EMS and its continued compliance, adequacy and effectiveness - a criterion that will be met
- pursuing and considering the development of cleaner techniques. Specifically for incineration plants and, where appropriate, for bottom ash treatment plants, BAT also consists of incorporating the following features into the EMS:
  - for incineration plants, waste stream management (see BAT 9) - criterion to be met
  - for bottom ash treatment plants, production quality management (see BAT 10) - not applicable
- a residue management plan including measures aimed at:
  - minimization of waste generation - criterion to be met
  - optimizing the reuse, regeneration, recycling and/or energy recovery of waste - criterion to be met
  - ensuring proper disposal of residues - criterion to be met
- for incineration plants, an OTNOC (Other than normal operating conditions) management plan (BAT 18 criteria to be applied) - criterion to be met
- for incineration plants, an accident management plan. The company will implement the necessary management techniques, i.e. will prepare:
  - Odour management plan
  - Noise management plan
  - Accident management plan
- for bottom ash treatment plants, management of diffuse dust emissions (see BAT 23) - not applicable
- an odour management plan if odour pollution is expected and/or perfume in sensitive areas (see section 2.4) - although this would not be the case as the site is in an area declared by Giurgiu Local Council as an industrial area and the activity itself will not generate excessive odours the company will draw up such a plan
- a noise management plan - although this would not be required as the site is located in a large noise generating industrial area and the activity on the site under consideration does not generate noise levels above the legal permissible limits the company will prepare such a plan (in accordance with BAT 37)

2. Activity monitoring

The company will observe and apply the provisions of:

a) BAT 2 provisions - consist of determining the gross electrical efficiency, gross energy efficiency or boiler efficiency of either the incineration plant as a whole or all relevant parts of the incineration plant.

In the case of a new incineration plant or after each modification of an existing incineration plant that could significantly affect energy efficiency, the gross electrical efficiency, gross energy efficiency or boiler efficiency shall be determined by conducting a full load performance test.
In the case of an existing incineration plant which has not been subject to a performance test or where a performance test at full load cannot be carried out for technical reasons, the gross electrical efficiency, gross energy efficiency or efficiency of the incinerator may be determined taking into account the design values under the performance test conditions - for S.C. Friendly Waste Romania S.R.L. the performance test will be achieved taking into consideration the projected values

b) BAT 3 provisions - consist of monitoring key process parameters relevant to emissions to air and water, including those listed below:

Table 99 - monitoring of key process parameters relevant for emissions to air and water

Flow/Site	Parameter(s)	Follow up	applicability to S.C. Friendly Waste România S.R.L.
Flue gases from waste incineration	Flow, oxygen content, temperature, pressure, water vapour content	Continuous measurement	- criterion to be met
Combustion chambers	Temperature		
Wastewater from FGC by wet methods	Flow, pH, temperature		- this is not the case because no water is used in the gas scrubbing process
Waste water from bottom ash treatment plants	Flow, pH, conductivity		- not applicable

c) BAT 4 provisions - consist of monitoring of airborne emissions at least at the frequencies indicated below and in accordance with EN standards. If EN standards are not available, BAT consists of using ISO standards, national standards or other international standards that ensure the provision of data of equivalent scientific quality as listed in the table:

Table 100 - Monitoring of airborne emissions

Substance/ Parameter	**Process**	**Standard(s) (1)**	**Minimum monitoring frequency (2)**	**Monitoring associated with**	**applicability to S.C. Friendly Waste România S.R.L.**
NO_x	Waste incineration	Generic EN standards	Continuous	BAT 29	- criterion to be met
NH3	Incineration of waste when using RNCS and/or RCS	Generic EN standards	Continuous	BAT 29	- not applicable
N2O	Incineration of waste in a fluidised bed stack	EN 21258 (3)	Once in a year	BAT 29	- not applicable
	Waste incineration when RNCS is made with urea				- not applicable
CO	Waste incineration	Generic EN standards	Continuous	BAT 29	- criterion that will be met
SO2	Waste incineration	Generic EN standards	Continuous	BAT 27	- criterion to be met
HCl	Waste incineration	Generic EN standards	Continuous	BAT 27	- criterion that will be met

HF	Waste incineration	Generic EN standards	Continuous (4)	BAT 27	- criterion to be met
Powders	Treating hearth ash	EN 13284-1	Once in a year	BAT 26	- not applicable
	Waste incineration	Generic EN standards and EN 13284- 2	Continuous	BAT 25	- criterion that will be met
Metals and metalloids except for mercury (As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Tl, V)	Waste incineration	EN 14385	Once at six months	BAT 25	- will be applied after obtaining the AM
Hg	Waste incineration	Generic EN standards and EN 14884	Continuous (5) NO the minimum frequency of once every six months will apply	BAT 31	to be applied after obtaining the AM by long-term sampling at a minimum frequency of once every six months and only when such waste is incinerated
TCOV	Waste incineration	Generic EN standards	Continuous	BAT 30	- criterion that will be met
PBDD/F	Waste incineration (6)	No EN standards available	Once at six months	BAT 30	- not applicable
PCDD/F	Waste incineration	EN 1948-1, EN 1948- 2, EN 1948-3	Every six months for short-term sampling	BAT 30	to be applied only where waste with such components is to be incinerated
		No EN standards available for long-term sampling, EN 1948-2, EN 1948- 3	Once a month for long-term sampling (7)		- not applicable
Dioxin-like PCBs	Waste incineration	EN 1948-1, EN 1948- 2, EN 1948-4	Every six months for short-term sampling (8)	BAT 30	- will be applied after obtaining the AM
		No EN standards available for long-term sampling, EN 1948-2, EN 1948- 4	Once a month for long-term sampling (7) (8)	BAT 30	- not applicable
Benzo(a)pyrene	Waste incineration	No EN standards available	Once in a year	BAT 30	- to be applied after the MA is obtained and only when such waste is incinerated

(1) The generic EN standards for continuous measurements are EN 15267-1, EN 15267-2, EN 15267-3 and EN 14181. EN standards for periodic measurements are given in the table or footnotes.

(2) With regard to periodic monitoring, the monitoring frequency will not apply if the installation would be operated solely for the purpose of measuring emissions.

ENE ANGELA
Aut. nr. 14

(3) If N_2O is subject to continuous monitoring, generic EN standards for continuous measurements shall apply.

(4) Continuous measurement of HF may be replaced by periodic measurements at a minimum frequency of once every six months if HCl emission levels are shown to be sufficiently stable. No EN standards are available for periodic HF measurement.

(5) For the facilities incinerating waste with a proven low and stable mercury content (e.g. a single waste stream with a controlled composition), continuous emission monitoring may be replaced by long-term sampling (no EN standards for long-term sampling are available for Hg) or periodic measurements at a minimum frequency of once every six months. In the latter case, the relevant standard is EN 13211.

(6) Monitoring shall only apply to the incineration of waste containing bromine flame retardants or installations using BAT 31 with continuous Brom injection.

(7) Monitoring will not apply if emission levels are shown to be sufficiently stable.

(8) Monitoring will not apply if dioxin-like PCB emissions are found to be less than 0.01 ng WHO-TEQ/ Nm3.

a) BAT 5 provisions - BAT consist of appropriate monitoring of the directed emissions to air from the incineration plant during OTNOC. Monitoring can be carried out by direct measurement of emissions (e.g. for pollutants that are continuously monitored) or by monitoring of surrogate parameters, if this proves to be of equivalent or better scientific quality compared to direct measurements of emissions. Emissions at start-up and shut-down, time during which no waste is incinerated, including PCDD/F emissions, are estimated based on measurement campaigns, e.g. once every three years, conducted during planned start-up/shut-down operations - to be applied after obtaining AM
b) BAT 6 provisions - not applicable
c) BAT 7 provisions - consist of monitoring the content of non-burning substances in slags and bottom ash in the incineration plant at a frequency at least equal to the frequency indicated below and in accordance with EN standards. Monitoring will be carried out after obtaining the MA and possibly according to the table below:

Table 101 - Activity monitoring according to BAT 7

Parameter	Standard(s)	Minimum monitoring frequency	Monitoring associated with
Loss on calcination (1)	EN 14899 and either EN 15169 or EN 15935	every 3 months.	BAT 14
Total organic carbon (1) (2)	EN 14899 and either EN 13137 or EN 15936		

(1) Either loss on ignition or total organic carbon shall be monitored.

(2) Elemental carbon (determined, for example, according to DIN 19539) may be subtracted from the measurement result

d) BAT 8 provisions - For the incineration of hazardous waste containing POPs, BAT is to determine the POPs content in the output streams (e.g. slag and bottom ash, flue gas, waste water) after commissioning of the incineration plant and after each change that may significantly affect the POPs content in the output streams - not applicable

3. Overall environmental performance and combustion efficiency

The company will observe and apply the provisions of:

a) BAT 9 - To improve the overall environmental performance of the incineration plant through waste stream management (as per BAT 1), BAT consists of using all techniques (a) to (c) below and, where appropriate, techniques (d), (e) and (f), (as per table below):

Table 102 - techniques applied to improve the overall environmental performance and efficiency of the combustion process

	Technique	Description	applicability to S.C. Friendly Waste România S.R.L.
a)	Determination of the types of waste that can be incinerated	Identification, based on the characteristics of the incineration plant, of the types of waste that can be incinerated taking into account, for example, physical state, chemical characteristics, hazardous properties, acceptable ranges of calorific value, moisture content, ash content and size	- criterion that will be met
b)	Establishment and implementation of waste characterization and pre-acceptance procedures	These procedures are designed to ensure the technical (and legal) suitability of the operations to treat a particular waste before it reaches the facility. These include procedures for collecting information on waste inputs and may include sampling and waste characterization to obtain sufficient information on waste composition. Waste pre-acceptance procedures are risk-based - for example, they consider the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, and information provided by the previous holder(s) of the waste	- criterion that will be met
c)	Establishment and implementation of waste characterization and pre-acceptance procedures	Acceptance procedures aim to confirm the characteristics of the waste that have been identified in the pre-acceptance stage. These procedures define the items to be checked when the waste is delivered to the facility, as well as the criteria for accepting and rejecting the waste. This may include sampling, inspection and analysis of the waste. Waste pre-acceptance procedures are risk-based - for example, they consider the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, and information provided by the previous holder(s) of the waste. The items to be monitored for each type of waste are detailed in BAT 11	- criterion that will be met
d)	Establishment and implementation of a tracking system and waste inventory	The tracking system and waste inventory are intended to track the location and quantity of waste in the facility. They contain all information generated during the pre-acceptance procedures (e.g. date of arrival at the facility and unique waste reference number, information on the previous holder(s) of the waste, results of analyses carried out for pre-acceptance and acceptance of the waste, nature and quantity of the waste on the site, including any identified hazards), acceptance, storage, treatment and/or off-site transfer of the waste. Waste pre-acceptance system are risk-based - for example, they consider the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, and information provided by	- criterion that will be met

		the previous holder(s) of the waste. The waste tracking system includes clear labelling of waste that is stored in places other than the waste hopper or sludge storage tank (e.g. in containers, drums, bales or other forms of packaging) so that it can be identified at any time	
e)	Waste sorting	Waste is stored separately, according to its properties, to facilitate storage and incineration in a less environmentally hazardous way. Waste sorting is based on the physical separation of different wastes and procedures that identify when and where they are deposited	- criterion to be met
f)	Check compatibility of waste before mixing or blending hazardous waste.	Compatibility is ensured by a set of screening and testing measures to detect any unwanted and/or potentially hazardous chemical reactions between wastes (e.g. polymerisation, outgassing, exothermic reaction, decomposition) during mixing or blending. Waste pre-acceptance tests are risk-based - for example, they consider the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, and information provided by the previous holder(s) of the waste.	- criterion that will be met

b) BAT 10 provisions - To improve the overall environmental performance of the bottom ash treatment plant, BAT consists of including in the EMS some of the resulting waste quality management features (see BAT 1) - not applicable

c) BAT 11 - To improve the overall environmental performance of the incineration plant, BAT consists of monitoring waste deliveries as part of the waste acceptance procedures (as per BAT 9 c), including, depending on the risk posed by the incoming waste, the items in the table below:

Table 103 - Monitoring elements at waste reception

Waste type	Monitoring waste deliveries
Municipal solid waste - not applicable Other non-hazardous waste	Radioactivity detection - not applicable Weighing of waste deliveries - criterion to be met Visual inspection - criterion to be met Regular sampling of waste deliveries and analysis of key properties/substances (e.g. calorific value, halogen and metal/metalloid content) - criterion to be met only where appropriate
Sewage sludge	Weighing of waste deliveries (or flow measurement if sewage sludge is delivered by pipeline) - not applicable Visual inspection, as far as technically feasible - criterion to be met only if applicable Regular sampling and analysis of key properties/substances (e.g. calorific value, water, ash and mercury content) - criterion to be met only where appropriate
Hazardous waste other than medical waste	Detection of radioactivity - criterion met only when appropriate Weighing of waste deliveries - criterion met Visual inspection, as far as technically possible Control of each delivery of waste and its comparison with the waste producer declaration - not applicable Sampling from: ○ all tankers and trailers - not applicable ○ packaged waste (e.g. in the drums, intermediate bulk containers (IBCs) or smaller packaging) and analysis - criterion to be met only when appropriate ○ combustion parameters (including calorific value and flash point) - criterion to be met only when appropriate

	○ compatibility of waste to detect possible hazardous reactions during mixing or blending of waste prior to landfilling (BAT 9 f) - criterion to be met ○ key substances including POPs, halogens and sulphur, metals/metalloids - criterion to be met only when appropriate
Medical waste	Detection of radioactivity - criterion to be met only when appropriate Weighing of waste deliveries - criterion to be met Visual inspection of packaging integrity - criterion to be met

d) BAT 12 provisions - To reduce the environmental risks associated with the reception, handling and storage of waste, BAT consists of using both of the techniques listed below:

Table 104 - Techniques applied to reduce environmental risks associated with waste reception, handling and storage

	Technique	Description
a)	Waterproofing surfaces with adequate drainage infrastructure	○ Depending on the risks posed by the waste in terms of soil or water contamination, the surface of the waste reception, handling and storage areas shall be made impermeable to the target liquids and equipped with appropriate drainage infrastructure (according to BAT 32) - criterion to be met - these activities shall be carried out on a concrete platform with a waterproofing membrane prior to pouring ○ The integrity of this surface shall be checked regularly, as far as technically possible - criterion that will be met
b)	Adequate waste storage capacity	Measures are taken to avoid the accumulation of this waste: ○ clear establishment and not exceeding of the maximum waste storage capacity, taking into account the characteristics of the waste (e.g. fire risk) and the treatment capacity - criterion to be met ○ regular monitoring of the amount of waste landfilled in relation to the maximum permitted landfill capacity - criterion to be met ○ for waste that is not mixed during storage (e.g. medical waste, packaged waste), the maximum residence time is clearly defined - criterion to be met

e) BAT 13 - To reduce the environmental risk associated with the storage and handling of medical waste, BAT consists of using a combination of the techniques set out below:

Table 105 - Combinations of techniques to reduce the environmental risk associated with the storage and handling of medical waste

	Technique	Description	APPLICABILITYto S.C. Friendly Waste România S.R.L.
a)	Automatic or semi-automatic waste handling	Medical waste will be unloaded from the van into the storage area using an automatic or manual system, depending on the risk involved. From the storage area, medical waste will be fed into the stack using an automatic feeding system	- criterion to be met
b)	Incineration of sealed containers that cannot be reused, if used	Medical waste will be delivered in sealed and resistant combustible containers that will never be opened during storage and handling operations. If they contain needles and sharp objects, the containers are also puncture-resistant	- criterion that will be met
c)	Cleaning and disinfection of reusable containers, if used	Reusable waste containers will be cleaned in a designated cleaning area and disinfected in a facility specifically designed for disinfection. Any debris from the cleaning operations will be incinerated	- criterion that will be met

f) BAT 14 - In order to improve the overall environmental performance of waste incineration, to reduce the content of non-burning substances in slags and bottom ash and to reduce emissions to air from waste incineration, BAT consists of using an appropriate combination of the techniques set out below:

Table 106 - Techniques used to improve the overall environmental performance of waste incineration

	Technique	Description	Applicability
a)	Mixing and blending of waste	Procedures for mixing and blending waste prior to incineration include, for example, the following operations: • mixing with hopper cranes - not applicable • use of a power equalization system - not applicable • mixing of compatible liquid and paste waste. In some cases, solid waste is shredded before mixing - criterion, which will only be met when appropriate	It will not apply if the stack must be directly fed for safety reasons or because of the characteristics of the waste (e.g. infectious medical waste, smelly waste or waste that is likely to release volatile substances). It will not apply in situations where undesirable reactions may occur between different types of waste (see BAT 9 f).
b)	Advanced control system	The use of a computerised automatic control system to control combustion efficiency and support emission prevention and/or reduction. The use of high performance monitoring of operating parameters and emissions is also included - criterion fully met	Generally applicable The IR 1000-300 incinerator and the continuous monitoring system of the operating and combustion parameters with which it will be equipped fully meets this requirement
c)	Optimizing the incineration process	Optimization of waste feed rate, waste composition, temperature, and primary and secondary combustion air flow rates and injection points to effectively oxidize organic compounds while reducing$_{NOX}$ production - criterion fully met by the IR 1000-300 incinerator	Design optimization will not apply to existing stacks

Table 107 - BAT-related environmental performance levels for non-aqueous substances in slags and bottom ash from waste incineration

Parameter	Unit	BAT-AEPL	Applicability to S.C. Friendly Waste România S.R.L.
COTcontent in slag and bottom ash (1)	% of dry weight	1-3 (2)	- not applicable
Loss on ignition of slag and hearth ash (1)	% of dry weight	1-5 (2)	- not applicable

(1) Either BAT-AEPL for TOC content or BAT-AEPL for loss on ignition shall be applied.

(2) The lower limit of the BAT-AEPL range may be reached when using fluidized bed stacks or when operating rotary slag stacks.

d) BAT 15 - In order to improve the overall environmental performance of the incineration plant and to reduce emissions to air, BAT consists of developing and implementing procedures to adjust the plant settings, e.g. by advanced control system, if and when necessary and practicable, based on waste characterization and control (according to BAT 11) - criterion met

e) BAT 16 - In order to improve the overall environmental performance of the incineration plant and to reduce emissions to air, BAT consists of developing and implementing operational procedures (e.g. organisation of the supply chain, continuous operation rather than intermittent operation) to limit shutdown and start-up operations as far as possible - criterion met

f) BAT 17 - In order to reduce emissions to air and, where relevant, emissions to water from the incineration plant, BAT is to ensure that the flue gas cleaning system and the waste water treatment plant are designed appropriately (e.g. taking into account peak

flow rates and pollutant concentrations), are operated within design limits and are maintained to ensure optimum availability - criterion met

g) BAT 18 provisions - In order to reduce the frequency of occurrence of OTNOC and to reduce emissions to air and, where appropriate, emissions to water from the incineration plant during OTNOC, BAT consists of the development and implementation of an OTNOC management plan based on risk analysis as part of the environmental management system (as per BAT 1), which includes all of the following elements:

- identification of potential OTNOCs (e.g. failure of equipment critical to environmental protection - 'critical equipment'), their root causes and potential consequences, and regular review and update of the list of OTNOCs identified by the periodic assessment - criterion met
- proper design of critical equipment (e.g. baghouse compartmentalization, flue gas heating techniques and elimination of the need to deactivate the baghouse during start-up and shut-down, etc.) - not applicable
- development and implementation of a preventive maintenance plan for critical equipment (according to BAT 1 (xii)) - criterion to be met
- monitoring and recording of emissions during OTNOC and related circumstances (according to BAT 5) - criterion to be met
- regular assessment of emissions occurring during OTNOC (e.g. frequency of events, duration and quantity of pollutants emitted) and implementation of remediation measures if necessary - criterion to be met

4. Energy efficiency

The company will observe and apply the provisions of:

a) BAT 19. In order to increase the resource efficiency of the incineration plant, BAT consists of the use of a heat recovery boiler - not applicable

b) BAT 20. To increase the energy efficiency of incineration plants, BAT consists of using an appropriate combination of the techniques listed below:

Table 108 - Techniques to increase the energy efficiency of incineration plants

	Technique	Description	General applicability	Applicability to S.C. Friendly Waste România S.R.L.
a)	Treatment sludge drying	After mechanical dewatering, the sewage sludge is further dried, using, for example, low temperature heat, before it is fed into the stack. The extent to which the sludge can be dried depends on the stack feed system	Applicable within the limits imposed by the availability of low energy heat	- not applicable
b)	Reduction of flue gas flow	The flue gas flow is reduced, for example, by: 1. improved primary and secondary combustion air distribution; 2. flue gas recirculation (see section 2.2). Lower flue gas flow reduces the energy requirements of the installation (e.g. for induced draught fans)	At the existing plants, the applicability of flue gas recirculation may be limited due to technical constraints (e.g. due to the pollutant load in the flue gas or incineration conditions)	1. criterion met 2. not applicable
c)	Minimizing bypass flows	Heat losses are minimized, for example by:	Boilers with integrated stack are not applicable to rotary	1. not applicable 2. criterion met

		1. the use of boilers with an integrated stack, which also allow heat recovery from the stack edges; 2. thermal insulation of stacks and boilers; 3. flue gas recirculation (see section 2.2); 4. heat recovery from slag and bottom ash cooling (see BAT 20 i)	kilns or other stacks for high temperature incineration of hazardous waste	3. not applicable 4. not applicable
d)	Optimizing boiler design	Heat transfer in the boiler is improved by optimization, for example: 1. speed and exhaust gas distribution; 2. water/steam circulation; 3. of convection coils; 4. online and offline boiler cleaning systems to minimize the fouling of convection coils	It will apply to new installations and major upgrades of existing installations	1. not applicable 2. not applicable it 3. not applicable 4. not applicable
e)	Low temperature flue gas heat exchangers	Special corrosion resistant heat exchangers are used for the recovery of additional energy from the flue gas at the boiler outlet after an electrostatic filter or dry adsorbent injection system	It shall be applied within the limits imposed by the operating temperature profile of the flue gas cleaning system. In the case of existing installations, applicability may be limited by lack of space	not applicable
f)	High steam parameters	The higher the steam parameters (temperature and pressure), the higher the electricity conversion efficiency allowed by the steam cycle. Operation at high steam parameters (e.g. above 45 bar and above 400°C) requires the use of special steel alloys or a refractory coating to protect those portions of the boiler that are exposed to the highest temperatures	It will apply to new installations and to major upgrades of existing installations where the installation is primarily geared to electricity generation. Applicability may be limited by: - stickiness of fly ash; - corrosiveness of flue gas	not applicable
g)	Co-generation	Combined heat and power generation, where the heat (mainly from the steam coming out of the turbine) is used to produce hot water/steam for use in industrial processes/activities or in a district heating/cooling network	Applicable within the limits imposed by local heat and electricity demand and/or grid availability	not applicable
h)	Flue gas condenser	A heat exchanger or heat exchanger scrubber in which the water vapor contained in the flue gas condenses, transferring latent heat energy into water at a sufficiently low temperature (e.g. the return flow of a district heating	Applicable within the limits imposed by low temperature heat demand, e.g. by the availability of a district heating network with a sufficiently low return temperature	not applicable

		network). The flue gas condenser also provides ancillary benefits by reducing airborne emissions (e.g. dust and acid gases). The use of heat pumps can increase the amount of energy recovered from flue gas condensation		
i)	Management of dry hearth ash	Hot dry hearth ash falls from the grate onto a conveyor system and cools in the ambient air. Energy is recovered by using cooling air for combustion	Applicable only for grill stacks. There may be technical restrictions that prevent upgrading of existing stacks	not applicable

(1) BAT-AEEL will only apply if a heat recovery boiler is used.

(2) The BAT-AEEL for gross electrical efficiency will only apply to installations or parts of installations that generate electricity using a condensing turbine.

(3) The upper limit of BAT-AEEL range can be reached using BAT 20 f.

(4) The BAT-AEEL for gross energy efficiency will only apply to installations or parts of installations that produce only heat energy or that produce electricity using a back pressure steam turbine and heat energy using the steam leaving the turbine.

(5) Gross energy efficiency exceeding the upper limit of the BAT-AEEL range (even above 100%) can be achieved if a flue gas condenser is used.

(6) For the incineration of treatment sludge, the boiler efficiency depends to a large extent on the water content of the sewage sludge introduced into the stack.

5. Directed emissions into the air

The company complies with and will apply the provisions of the BATs for:

a) diffuse emissions

1. BAT 21. To prevent or reduce diffuse emissions from the incineration plant, including odour emissions, BAT consists of:

a) storing the solid waste and bulk waste in bulk that is odorous and/or likely to release volatile substances in enclosed buildings under controlled sub-atmospheric pressure and use the extracted air as combustion air for incineration or send it to another appropriate abatement system in case of an explosion hazard - not applicable

b) storing the liquid waste in tanks under appropriate controlled pressure and direct tank vents to the combustion air supply system or other suitable abatement system - not applicable

c) control the risk of odour release during complete shutdown periods when no incineration capacity is available, e.g. by:

- sending the exhausted or extracted air to an alternative abatement system, e.g. wet scrubber, fixed adsorption bed - criterion met. The IE 1000R-300 incinerator is equipped with dry gas flushing system
- minimizing the amount of waste landfilled, e.g. by interrupting, reducing or transferring waste deliveries, as part of waste stream management (see BAT 9) - to be applied after obtaining the MA
- the storage of waste in properly sealed bales - a criterion to be met only where appropriate

2. BAT 22. To prevent diffuse emissions of volatile compounds caused by handling gaseous and liquid wastes that are odorous and/or likely to release volatile substances in incineration plants, BAT consists of direct feeding them into the stack. For gaseous and liquid wastes delivered in waste containers suitable for incineration (e.g. drums),

direct feed is achieved by placing the containers directly into the stack - criterion to be met

They may not be applicable to sewage sludge incineration, depending for example on the water content and the need for pre-drying or mixing with other wastes.

3. BAT 23. In order to prevent or reduce diffuse powder emissions to air from the treatment of slag and bottom ash, BAT consists of including the following elements of diffuse dust emission management in the environmental management system (see BAT 1):

- identification of the most relevant sources of diffuse powder emissions (e.g. using EN 15445) - not applicable
- definition and implementation of appropriate measures and techniques to prevent or reduce diffuse emissions over a period of time - not applicable

4. BAT 24. To prevent or reduce diffuse airborne dust emissions from treating slag and bottom ash, BAT consists of using an appropriate combination of the techniques listed below:

Table 109 - techniques to prevent or reduce diffuse airborne powder emissions from slag and bottom ash treatment

	Technique	Description	Applicability	Applicability to S.C. Friendly Waste România S.R.L.
a)	Equipment enclosure and covering	The use of enclosures/encapsulators for operations that produce powders (such as grinding, sieving) and/or the covering of conveyor belts and elevators. Enclosure can also be achieved by installing all equipment in an enclosed building	Installation of equipment in an enclosed building cannot apply to mobile treatment devices	Not applicable
b)	Limitation of discharge height	Matching the discharge height to the variable height of the landfill, if possible in an automated way (e.g. with height-adjustable conveyor belts)	Generally applicable	Not applicable
c)	Protecting stocks from prevailing winds	Protecting bulk storage areas or stockpiles with hedging or wind barriers such as screens, walls or vertical green spaces, and orienting stockpiles correctly to prevailing winds	Generally applicable	Not applicable
d)	Use of water spraying devices	Installation of water spraying devices at the main sources of diffuse dust emissions. Humidification of the powder particles contributes to agglomeration and sedimentation of the powders. Diffuse powder emissions from stockpiles are reduced by ensuring adequate humidification of loading and unloading points or the stockpiles themselves	Generally applicable	Not applicable
e)	Optimizing moisture content	Optimization of the moisture content of slag/fired ash to the level required for efficient recovery of metals and mineral materials while reducing dust emissions	Generally applicable	Not applicable
f)	Operation under sub-atmospheric pressure	Carrying out treatment of slag and bottom ash in closed equipment or buildings (see technique a) under sub-atmospheric pressure to enable the exhaust air to be treated with a reduction technique (see BAT 26) as a controlled emission	To be applied only to dry bottom ash and other low moisture bottom ash	Not applicable

b) directed emissions

For each of the cases below the company will observe and apply the provisions of:

- **emissions of powders, metals and metalloids**

BAT 25. In order to reduce airborne emissions of powders, metals and metalloids from waste incineration, BAT consists of using one or a combination of the following techniques.

Table 110 - Techniques indicated by BAT to reduce airborne emissions of dust, metals and metalloids from waste incineration

Technique	Description	Applicability	Applicability to S.C. Friendly Waste România S.R.L.
Bag filter	Bag filters or textile filters are made of a porous or soaked fabric through which gases pass to remove particles. If a bag filter is used, a fabric suitable for the flue gas characteristics and maximum operating temperature must be chosen.	Generally applicable to new facilities. It will apply to existing installations within the limits imposed by the operating temperature profile of the flue gas cleaning system.	The incinerator is equipped with a filtration system with 144 bags made of textile fabric and fiberglass
Electrostatic precipitator	Electrostatic precipitators work by electrically charging particles and separating them under the influence of an electric field. These precipitators can operate in a wide variety of conditions. Reduction efficiency may depend on the number of fields, the dwell time (size) and the upstream particulate removal devices. Electrostatic precipitators generally include between two and five fields. These precipitators can be of the dry or wet type, depending on the technique used to collect the powders from the electrodes. Wet electrostatic precipitators are generally used in the polishing stage to remove residual powders and droplets after wet scrubbing.	Generally applicable.	Not applicable
Dry adsorbent injection	Injection and dispersion of the adsorbent as a dry powder into the flue gas stream. Alkaline adsorbents (e.g. sodium bicarbonate, hydrated lime) are injected to react with acid gases (HCl, HF and SO_X). Activated carbon is injected or co-injected to adsorb mainly in PCDD/F and mercury. The resulting solids are removed, most often with a bag filter. Excess reagents can be recirculated to reduce their consumption, possibly after reactivation by maturation or steam injection (see BAT 28 b). Not relevant to reduce the powder emissions. Adsorption of metals by injection of activated carbon or by injection of other reagents in combination with a dry adsorbent injection system or with a semi-wet adsorbent, which is used to reduce acid gas emissions. It is not relevant for reducing dust emissions. Adsorption of metals by injection of activated carbon or by injection of other reagents in combination with a dry adsorbent injection system or with a semi-wet adsorbent, which is used to reduce acid gas emissions.	Generally applicable.	Not applicable
Wet scrubber	The use of a liquid, usually water or aqueous solution/suspension, to adsorb pollutants from the flue gas, especially acid gases, as well as other soluble compounds and solids. To adsorb mercury and/or PCDD/F, carbon scrubber can be added to the wet scrubber (in paste form or as a carbon impregnated plastic package). Different types of scrubber designs are used, e.g. jet scrubbers, rotary scrubbers, Venturi scrubbers, spray scrubbers and distillation packed columns. Wet treatment systems are not used to remove the main dust load, but are used, if installed after other abatement techniques, to further reduce concentrations of dust, metals and metalloids in the flue gas.	There may be some limitations in applicability due to reduced water availability, for example in arid areas.	Not applicable

Adsorption in fixed bed or continuous motion bed	The flue gas passes through a fixed bed or moving bed filter where an adsorbent (e.g. active coke, active lignite or a carbon-impregnated polymer) is used to adsorb the pollutants. The system is mainly used for the adsorption of mercury and other metals and metalloids as well as organic compounds, including PCDD/F, but it also acts as an effective filter for dust cleaning.	Applicability may be limited by the overall pressure drop due to the flue gas cleaning system configuration. In the case of existing installations, applicability may be limited by lack of space.	The hazardous waste incinerator is equipped with a dry flue gas scrubbing plant

Table 111 - BAT related emission levels BAT (BAT-AEL) for airborne emissions of powders, metals and metalloids

Parameter	BAT-AELs	Average value calculation period	Applicability to S.C. Friendly Waste România S.R.L.
Powders	< 2-5 ([1])	Daily average	criterion met by the IE 1000R- 300 incinerator
Cd+Tl	0.005-0.02	Average per sampling period	
Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V	0.01-0.3	Average per sampling period	

For existing plants intended for the incineration of hazardous waste and where a bag filter will not be applied, the upper BAT-AEL is 7 mg/Nm^3

The associated monitoring is stipulated in BAT 4.

BAT 26. In order to reduce airborne emissions of dust from the treatment of slag and bottom ash in closed equipment with air extraction (see BAT 24 f), BAT consists of treating the extracted air with a bag filter (see section 2.2) - not applicable for S.C. Friendly Waste Romania S.R.L. because it will not incinerate such waste.

Table 112 - BAT (BAT-AELs) for airborne emissions of dust from slag and bottom ash treatment in closed equipment with air extraction

Parameter	BAT-AELs *(mg/Nm^3)*	Average value calculation period	Applicability to S.C. Friendly Waste România S.R.L.
Powders	2-5	Average per sampling period	criterion met by the IE 1000R-300 incinerator

The associated monitoring is stipulated in BAT 4.

- **HCl, HF and SO_2 emissions**

BAT 27. In order to reduce the airborne emissions of HCl, HF and SO2 from waste incineration, BAT consists of using one or a combination of the following techniques.

Table 113 - techniques indicated to reduce the release of HCl, HF and SO2 to air from waste incineration

Technique	Description	Applicability	Applicability to S.C. Friendly Waste România S.R.L.
Wet scrubber	The use of a liquid, usually water or aqueous solution/suspension, to adsorb pollutants from the flue gas, especially acid gases, as well as other soluble compounds and solids. To adsorb mercury and/or PCDD/F, carbon scrubber can be added to the wet scrubber (in paste form or as a carbon impregnated plastic package). Different types of scrubber designs are used, e.g. jet scrubbers, rotary scrubbers, Venturi scrubbers, spray scrubbers and distillation packed columns. Wet treatment systems are not used to remove the main dust load, but are used, if installed after other abatement techniques, to further reduce concentrations of dust, metals and metalloids in the flue gas.	There may be some limitations in applicability due to reduced water availability, for example in arid areas.	Not applicable
Semi-moistened absorbent	Also called semi-dry absorbent. An aqueous alkaline solution or alkaline suspension (e.g. whitewash) is added to the flue gas stream to catch acid gases. The water evaporates and the reaction products are dried. The resulting solids can be recirculated to reduce reagent consumption (see BAT 28 b). This technique includes a number of different models, including flash-dry processes, which consist of injecting water (resulting in rapid cooling of the gas) and reagent at the inlet to the filter.	Generally applicable	Not applicable
Dry adsorbent injection	Injection and dispersion of the adsorbent as a dry powder into the flue gas stream. Alkaline adsorbents (e.g. sodium bicarbonate, hydrated lime) are injected to react with acid gases (HCl, HF and SO_X). Activated carbon is injected or co-injected to adsorb mainly in PCDD/F and mercury. The resulting solids are removed, most often with a bag filter. Excess reagents can be recirculated to reduce their consumption, possibly after reactivation by maturation or steam injection (see BAT 28 b). Not relevant to reduce the powder emissions. Adsorption of metals by injection of activated carbon or by injection of other reagents in combination with a dry adsorbent injection system or with a semi-wet adsorbent, which is used to reduce acid gas emissions.	Generally applicable.	Not applicable
Direct desulphurisation	Adding magnesium or calcium-based absorbents to the bed of a fluidized bed stack. Used to partially reduce upstream acid gas emissions compared to other techniques.	It will only apply to fluidized bed stacks.	Not applicable
Injection of sorbent into the boiler	Injection of magnesium or calcium-based absorbents at high temperatures into the afterburning zone of the boiler to achieve partial reduction of acid gases. The technique is very effective in eliminating SO_X and HF and offers additional benefits in terms of capping peak emission levels.	Generally applicable	Not applicable

BAT 28. In order to reduce peak levels of airborne HCl, HF and SO_2 emissions from waste incineration while limiting the consumption of reagents and the amount of residues generated by the injection of dry adsorbent and semi-wet sorbents, BAT consists of using technique (a) or both techniques indicated below:

Table 114 - techniques used to reduce peak levels of HCl, HF and SO2 airborne emissions from waste incineration while limiting reagent consumption and the amount of residues generated from adsorbent injection

	Technique	Description	Applicability	Applicability to S.C. Friendly Waste România S.R.L.
	Optimization and automation of reagent dosing	Use of continuous HCl and/or SO2 measurements (and/or other parameters that may be useful for this purpose) upstream and/or downstream of the flue gas cleaning system to optimise automated reagent dosing.	Generally applicable.	criterion met
	Recirculation of reagents	Recirculation of a proportion of the solid residues collected from flue gas cleaning in order to reduce the amount of unreacted reagent (unreacted reagents) in the residues. The technique is particularly relevant for flue gas scrubbing techniques operating with a high stoichiometric excess.	Generally applicable to new facilities. It will be applied to existing installations within the bag filter size limits.	Not applicable

Table 115 - BAT (BAT-AELs) - related emission levels for the airborne emissions of HCl, HF and SO2 from waste incineration

Parameter	BAT-AELs *(mg/Nm³)*		Average value calculation period	Applicability to S.C. Friendly Waste România S.R.L.
	New plant	Existing plant		
HCl	< 2-6 (1)	< 2-8 (1)	Daily average	criterion met by the IE 1000R-300 incinerator
HF	< 1	< 1	Daily average or average over the sampling period	
SO2	5-30	5-40	Daily average	

(1) The lower limit of BAT-AEL range can be reached using a wet scrubber; the upper limit of the range can be associated with the use of dry adsorbent injection.

The associated monitoring is stipulated in BAT 4.

- **emissions of NO_x, NO_2, CO and NH_3**

BAT 29. In order to reduce NO_X emissions to air while limiting CO and N_2O emissions from waste incineration and NH_3 emissions from the use of RNCS and/or RCS, BAT consists of using an appropriate combination of the techniques indicated below.

Table 116 - BAT techniques suitable for reducing NOX air emissions while limiting CO and N2O emissions from waste incineration and NH3 emissions from RNCS and/or RCS use

Technique	Description	Applicability	Applicability to S.C. Friendly Waste România S.R.L.
Optimizing the incineration process	Optimization of waste feed rate, waste composition, temperature, and primary and secondary combustion air flow rates and injection points to effectively oxidize organic compounds while reducing NOx.	Generally applicable	criterion met
Flue gas recirculation	Partial recirculation of flue gas to the stack to replace some of the fresh combustion air, this has the dual effect of cooling the temperature and limiting the O_2 content for nitrogen oxidation, thus limiting NO_xproduction. It involves directing the flue gases from the stack into the flame to reduce the oxygen content and therefore the flame temperature. This technique also reduces energy losses from flue gases. Energy savings are also achieved when recirculated flue gas is extracted before flue gas cleaning, as the flow of gas through the flue gas cleaning system is reduced and thus the size of the required flue gas cleaning system is reduced.	In the case of existing installations, applicability may be limited due to technical constraints (e.g. due to pollutant load in flue gas or incineration conditions).	Not applicable
Selective non-catalytic reduction (RNCS)	Selective nitrogen reduction of nitrogen oxides with ammonia or urea at high temperatures and without catalyst. The operating temperature range is maintained between 800°C and 1,000°C for optimum reaction. The performance of RNCS system can be enhanced by controlling the injection of reagent from multiple lance injectors using an acoustic (rapid response) or infrared temperature measurement system to ensure that the reagent is injected in the optimum temperature zone at all times.	Generally applicable	Not applicable
Selective catalytic reduction (RCS)	Selective reduction of nitrogen oxides with ammonia or urea in the presence of a catalyst. This technique is based on the reduction of NO_X to nitrogen on a catalytic bed by reaction with ammonia at an optimum operating temperature, which is generally around the following values: 200-450°C for a high dust RCS unit location and 170-250 °C for a tail end RCS unit location. Ammonia is generally injected as an aqueous solution; the ammonia source can also be anhydrous ammonia or a urea solution. Several layers of catalyst can be applied. Greater NO_X reduction is achieved by using a larger surface area of the catalyst, installed as one or more layers. An "in-line" or "no-reaction pass" RCS system combines RNCS with downstream RCS that reduces ammonia leakage from the RNCS.	In the case of existing installations, applicability may be limited by lack of space.	Not applicable
Bag-type catalytic filters	Filter bags are either impregnated with a catalyst or the catalyst is mixed directly with organic material in the production of the fibers used for the filter medium. Such filters can be used to reduce PCDD/F emissions as well as, in combination with a NH_3 source, to reduce NOx.	Only to be applied to installations equipped with a bag filter.	Not applicable
Optimization of the the design and use of the RNCS/ RCS	Optimization of the NOx on the cross-section of the stack or duct, optimizing the size of the reagent droplets and optimizing the temperature range in which the reagent is injected.	It will only apply if RNCS and/or RCS are used to reduce NOx.	Not applicable

Wet scrubber	The use of a liquid, usually water or aqueous solution/suspension, to adsorb pollutants from the flue gas, especially acid gases, as well as other soluble compounds and solids. To adsorb mercury and/or PCDD/F, carbon scrubber can be added to the wet scrubber (in paste form or as a carbon impregnated plastic package). Different types of scrubber designs are used, e.g. jet scrubbers, rotary scrubbers, Venturi scrubbers, spray scrubbers and distillation packed columns. Wet treatment systems are not used to remove the main dust load, but are used, if installed after other abatement techniques, to further reduce concentrations of dust, metals and metalloids in the flue gas. If a wet scrubber is used for acid gas reduction, especially with RNCS, the unreacted ammonia is absorbed by the scrubbing solution and, once removed, can be recycled as RNCS or RCS reagent.	There may be some limitations in applicability due to reduced water availability, for example in arid areas.	Not applicable

Table 117 - BAT (BAT-AELs) related emission levels for NOX and CO emissions to air from

Parameter	**BAT-AELs** *(mg/Nm³)*		**Average value calculation period**	**Applicability to S.C. Friendly Waste România S.R.L.**
	New plant	**Existing plant**		
NO_x	50-120 (1)	50-150 (1) (2)	Not applicable	criterion met
CO	10-50	10-50		
NH_3	2-10 (1)	2-10 (1) (3)		

[1] The lower limit of the BAT-AEL range can be reached RCS: The lower limit of the BAT-AEL range may not be reachable for the incineration of waste with a high nitrogen content (e.g. residues from the production of organic compounds and nitrogen).
[2] Upper BAT-AEL range limit is 180 mg/Nm³ if RCS is not applied
[3] For existing installations equipped with RNCS without wet abatement techniques, the upper BAT-AEL range limit is 15 mg/Nm³

The associated monitoring is stipulated in BAT 4.

- **emissions of organic compounds**

BAT 30. In order to reduce airborne emissions of organic compounds - including PCDD/F and PCB - from waste incineration, BAT consists of the use of techniques (a), (b), (c), (d) and one or a combination of techniques (e) to (i) below.

Table 118 - BAT techniques used to reduce airborne emissions of organic compounds - including PCDD/F and PCBs - from waste incineration

Technique	**Description**	**Applicability**	**Applicability to S.C. Friendly Waste România S.R.L.**
Optimizing the incineration process	Optimization of waste feed rate, waste composition, temperature, and primary and secondary combustion air flow rates and injection points to effectively oxidize organic compounds while reducing NOx. Optimization of incineration parameters to promote the oxidation of organic compounds, including PCDD/F and PCBs present in the waste, and to prevent their (re-)formation and their precursors.	Generally applicable	criterion met

Waste supply control	Knowledge and control of the combustion characteristics of the waste introduced into the stack in order to ensure optimal and, as far as possible, homogeneous and stable incineration conditions.	**It will not apply to medical waste** or municipal solid waste.	criterion met
Cleaning the boiler when it is on and when it is off	Efficient cleaning of incinerator coils to reduce stagnation time and dust accumulation in the incinerator, thus reducing PCDD/F formation in the boiler. A combination of techniques is used to clean incinerators when they are switched on and when they are switched off.	Generally applicable.	criterion met
Rapid flue gas cooling	Rapid cooling of flue gas from temperatures above 400°C to 250°C prior to dust reduction to prevent *de novo* synthesis of PCDD/F. This is achieved by proper boiler design and/or the use of a cooling system. This latter option limits the amount of energy that can be recovered from the flue gas and is used in particular for the incineration of hazardous waste with a high halogen content.	Generally applicable	criterion met
Dry adsorbent injection	Injection and dispersion of the adsorbent as a dry powder into the flue gas stream. Alkaline adsorbents (e.g. sodium bicarbonate, hydrated lime) are injected to react with acid gases (HCl, HF and SOX). Inject or co-inject activated coal to adsorb mainly in PCDD/F and mercury. The resulting solids are removed, most often with a bag filter. Excess reagents can be recirculated to reduce their consumption, possibly after reactivation by maturation or steam injection (see BAT 28 b). Adsorption by injection of activated coal or other reagents, generally combined with a bag filter, with formation of a reaction layer in the filter cake and removal of the solids generated.	Generally applicable	Not applicable
Adsorption in fixed bed or continuous motion bed	The flue gas passes through a fixed bed or moving bed filter using an adsorbent (e.g. active coke, active lignite or a carbon-impregnated polymer) that adsorbs pollutants.	Applicability may be limited by the overall pressure drop due to the flue gas cleaning system. In the case of existing installations, applicability may be limited by lack of space.	Not applicable
SCR	Selective reduction of nitrogen oxides with ammonia or urea in the presence of a catalyst. This technique is based on the reduction of NOXX to nitrogen on a catalytic bed by reaction with ammonia at an optimum operating temperature, which is generally around the following values: 200-450°C for a high dust RCS unit location and 170-250 °C for a tail end RCS unit location. Ammonia is generally injected as an aqueous solution; the ammonia source can also be anhydrous ammonia or a urea solution. Several layers of catalyst can be applied. Greater NOX reduction is achieved by using a larger surface area of the catalyst, installed as one or more layers. An "in-line" or "no-reaction pass" RCS system combines RNCS with downstream RCS that reduces ammonia leakage from the RNCS. If RCS is used to reduce NO_x reduction, the appropriate catalyst surface within the SCR system also allows partial reduction of PCDD/F and PCB emissions. This technique is generally used in combination with technique (e), (f) or (i).	In the case of existing installations, applicability may be limited by lack of space	Not applicable
Bag-type catalytic filters	Filter bags are either impregnated with a catalyst or the catalyst is mixed directly with organic material in the production of the fibers used for the filter medium. Such filters can be used to reduce PCDD/F emissions as well as, in combination with an NH_3 source, to reduce NO_X emissions.	Only to be applied to installations equipped with a bag filter.	Not applicable

Carbon absorbent in a wet scrubber	PCDD/F and PCB are adsorbed by the carbon absorbent added to the wet scrubber, either in the scrubbing solution or as impregnated fillers. This technique is used to remove PCDD/F in general and also to prevent and/or reduce PCDD/F emissions accumulated in the scrubber (so-called memory effect), especially during shutdown and start-up periods.	Only to be applied to installations equipped with a wet scrubber.	Not applicable

Table 119 - BAT (BAT-AELs) related emission levels for dioxin-like TCOV, PCDD/F and PCB emissions to air from waste incineration

Parameter	Unit	**BAT-AELs** *(mg/Nm³)*		**Average value calculation period**
		New plant	**Existing plant**	
TCOV	mg/Nm3	< 3-10	< 3-10	Daily average
PCDD/F ([1])	ng I-TEQ/Nm3	< 0.01-0.04	< 0.01-0.06	Average per sampling period
		< 0.01-0.06	< 0.01-0.08	Long-term sampling period ([2])
PCDD/F + dioxin-like PCBs ([1])	ng WHO-TEQ/Nm3	< 0.01-0.06	0.01-0.08	Average per sampling period
		< 0.01-0.08	< 0.01-0.1	Long-term sampling period ([2])

([1]) Either BAT-AEL for PCDD/F or BAT-AEL for PCDD/F + dioxin-like PCBs will apply.
(2) BAT-AEL will not apply if emission levels are shown to be sufficiently stable.

The associated monitoring is stipulated in BAT 4.

- **mercury emissions**

BAT 31. To reduce airborne mercury emissions (including peak levels of mercury emissions) from waste incineration, BAT consist of using one or a combination of the techniques listed below.

Table 120 - BAT techniques to reduce airborne mercury emissions (including peak levels of mercury emissions) from waste incineration

Technique	Description	Applicability	Applicability to S.C. Friendly Waste România S.R.L.
Wet scrubber (low pH)	The use of a liquid, usually water or aqueous solution/suspension, to adsorb pollutants from the flue gas, especially acid gases, as well as other soluble compounds and solids. To adsorb mercury and/or PCDD/F, carbon scrubber can be added to the wet scrubber (in paste form or as a carbon impregnated plastic package). Different types of scrubber designs are used, e.g. jet scrubbers, rotary scrubbers, Venturi scrubbers, spray scrubbers and distillation packed columns. Wet treatment systems are not used to remove the main dust load, but are used, if installed after other abatement techniques, to further reduce concentrations of dust, metals and metalloids in the flue gas. A wet scrubber that works at a pH value of about 1. The removal rate of mercury by this technique can be improved by adding reagents and/or adsorbents in the washing solution, for example: • oxidants, such as hydrogen peroxide, to convert elemental mercury into a water-soluble oxidized form; • sulphur compounds to form stable complexes or salts with mercury; • carbon adsorbent to adsorb mercury, including elemental mercury. When designed for a buffer capacity large enough for mercury catchment, the technique effectively prevents peak levels from mercury emissions.	There may be some limitations in applicability due to reduced water availability, for example in arid areas.	Not applicable
Adsorbent injection dry	Injection and dispersion of the adsorbent as a dry powder into the flue gas stream. Alkaline adsorbents (e.g. sodium bicarbonate, hydrated lime) are injected to react with acid gases (HCl, HF and SOX). Inject or co-inject activated coal to adsorb mainly in PCDD/F and mercury. The resulting solids are removed, most often with a bag filter. Excess reagents can be recirculated to reduce their consumption, possibly after reactivation by maturation or steam injection (see BAT 28 b). Adsorption by injection of activated coal or other reagents, generally combined with a bag filter, with formation of a reaction layer in the filter cake and removal of the solids generated.	Generally applicable	Not applicable
Coal injection specially activated, extremely reactive	Injection of highly reactive activated coal doped with sulphur or other reagents to improve reactivity with mercury. Usually, the injection of this special activated coal is not continuous, but only takes place when a peak level of mercury is detected. For this purpose, the technique can be used in combination with continuous monitoring of mercury in raw flue gases.	The technique may not be applicable to sewage sludge incineration plants.	Not applicable

Adding brom to the boiler	The Brom added to the waste or injected into the stack is converted at high temperatures to elemental bromine, which oxidizes elemental mercury, resulting in $HgBr_2$, which is water-soluble and strongly adsorbable. This technique is used in combination with a downstream reduction technique such as a wet scrubber or activated coal injection system. Usually, Brom injection is not continuous, but occurs only when a peak level of mercury is detected. For this purpose, the technique can be used in combination with continuous monitoring of mercury in raw flue gases.	Generally applicable.	Not applicable
Adsorption in fixed bed or continuous motion bed	The flue gas passes through a fixed bed or moving bed filter using an adsorbent (e.g. active coke, active lignite or a carbon-impregnated polymer) that adsorbs pollutants.	Applicability may be limited by the overall pressure drop due to the flue gas cleaning system. In the case of existing installations, applicability may be limited by lack of space.	The IE 1000R-300 incinerator is equipped with dry gas scrubber

Table 121 - BAT (BAT-AELs) related emission levels for mercury emissions to air from

Parameter	Unit	BAT-AEL (1)		Average value calculation period
		New plant	Existing plant	
Hg	*(mg/Nm³)*	< 5-20 (2)	< 5-20 (2)	Daily average or average over the sampling period
		1-10	1-10	Long-term sampling period (2)

(1) Either BAT-AEL for daily average or sampling period average or BAT-AEL for long-term sampling period shall be applied. BAT-AEL for long-term sampling can be applied for waste incineration facilities with a mercury content level that has been shown to be low and stable (e.g. single waste streams with a controlled composition).

(2) The lower limit of the BAT-AEL range can be reached:

- when waste with a mercury content level that has been shown to be low and stable is incinerated (e.g. single waste streams with a controlled composition); or
- by using specific techniques to prevent or reduce the occurrence of peak levels of mercury emissions during the incineration of non-hazardous waste. The upper limit of BAT-AEL ranges can be associated with the use of dry adsorbent injection.

As a guide, the average mercury emission levels for half an hour will generally be:

- < 15-40 µg/Nm³ for the existing plants;
- < 15-35 µg/Nm³ for the new plants;

The associated monitoring is stipulated in BAT 4.

5. Emissions to water

The company complies with and will apply the provisions of the BATs for:

a) BAT 32. To prevent contamination of uncontaminated water, reduce emissions to water and increase resource efficiency, BAT consists of separating wastewater streams and treating them separately according to their characteristics.

Description

Wastewater streams (e.g. surface water discharges, cooling water, wastewater from flue gas treatment and from the treatment of bottom ash, runoff collected from waste reception, handling and storage areas (see BAT 12 (a)) are segregated for separate treatment depending on their characteristics and the combination of treatment techniques required. Uncontaminated water flows are separated from wastewater flows requiring treatment.

When recovering hydrochloric acid and/or gypsum from the scrubber effluent, the wastewater from the different stages (acid and alkaline) of the wet scrubber system is treated separately.

Applicability

Generally applicable to new facilities.

Applicable to existing installations within the limits imposed by the configuration of the water catchment system.

Criteria met by S.C. Friendly Waste România S.R.L.

b) BAT 33. To reduce water use and prevent or reduce wastewater generation from the incineration plant, BAT consists of using one or a combination of the techniques listed below.

Table 122 - BAT techniques to reduce water use and prevent or reduce wastewater generation from the

Technique	Description	Applicability	Applicability to S.C. Friendly Waste România S.R.L.
Techniques for flue gas cleaning without wastewater	Use of flue gas cleaning techniques that do not generate wastewater (e.g. injection of dry adsorbent or semi-wet adsorbent, see section 2.2).	It may not be applicable for the incineration of hazardous waste with a high halogen content.	Not applicable
Injection of wastewater from flue gas cleaning techniques	Wastewater from flue gas cleaning techniques is injected into the hotter parts of the flue gas cleaning system.	It will only apply to the incineration of municipal solid waste.	Not applicable
Water reuse/recycling	Wastewater streams are reused or recycled. The degree of reuse/recycling is limited by the quality requirements of the process for which the water is intended.	Generally applicable.	Not applicable
Management of dry hearth ash	Hot dry hearth ash falls from the grate onto a conveyor system and cools in the ambient air. No water is used in the process.	Applicable only for grill stacks. There may be technical restrictions that prevent upgrading of existing incineration plants.	criterion met at hazardous waste incinerator

BAT 34. In order to reduce emissions to water from flue gas cleaning and/or slag and bottom ash storage and treatment, BAT consists of using an appropriate combination of the techniques listed below and using secondary techniques as close to the source as possible to avoid dilution.

Table 123 - BAT techniques for reducing emissions to water from flue gas cleaning and/or slag and bottom ash storage and treatment

	Technique	Typical pollutants targeted	Applicability to S.C. Friendly Waste România S.R.L.
Primary techniques			
	Optimization of the incineration process (see BAT 14) and/or flue gas cleaning system (e.g. RNCS/RCS, see BAT 29 (f))	Organic compounds including PCDD/F, ammonia/ammonium	criterion met
Secondary techniques (1)			
Preliminary and primary treatment			
	Equalisation	All pollutants	Not applicable
	Neutralization	Acids, alkalis	Not applicable
	Physical separation, e.g. by screens, grates, desanders, primary decanters	Coarse solids, suspended solids	Not applicable
Physico-chemical treatment			
	Adsorption on activated coal	Organic compounds, including PCDD/F, mercury	Not applicable
	Precipitation	Dissolved metals/dissolved metalloids, sulphate	Not applicable
	Oxidation	Sulphide, sulphite, organic compounds	Not applicable
	Ion exchange	Dissolved metals/dissolved metalloids	Not applicable
	Stripping	Purgeable pollutants (e.g. ammonia/ammonium)	Not applicable
	Reverse osmosis	Ammonia/ammonium, metals/metalloids, sulphate, chloride, organic compounds	Not applicable
Final disposal of solids			
	Coagulation and flocculation	Suspended solids, metal/metalloid particles	Not applicable
	Sedimentation		Not applicable
	Filtration		Not applicable
	Flotation		Not applicable

(1) These techniques are described in the section "**Applied BAT techniques**" that follows.

Table 124 - : BAT-AEL values for direct emissions to a receiving water body

Parameter		**Process**	**Unit**	**BAT-AEL (1)**
Total suspended solids (TSS)		FGC Treating hearth ash	mg/l	10-30
Total organic carbon (TOC)		FGC Treating hearth ash		15-40
Metals and metalloids	As	FGC		0.01-0.05
	Cd	FGC		0.005-0.03
	Cr	FGC		0.01-0.1
	Cu	FGC		0.03-0.15
	hg	FGC		0.001-0.01
	Ni	FGC		0.03-0.15
	Pb	FGC Treating hearth ash		0.02-0.06
	Sb	FGC		0.02-0.9

	Ti	FGC		0.005-0.03
	Zn	FGC		0.01-0.5
Ammoniacal nitrogen (NH4-N)		Treating hearth ash		10-30
Sulphate (SO42-)		Treating hearth ash		400-1 000
PCDD/F		FGC	ng I-TEQ/l	0.01-0.05

([1]) The averaging periods have been defined in the section "General considerations". The associated monitoring is stipulated in BAT 6.

Table 125 - BAT-AEL values for indirect emissions in a receiving water body

Parameter		Process	Unit	BAT-AEL (1) (2)
Metals and metalloids	As	FGC	mg/l	0.01-0.05
	Cd	FGC		0.005-0.03
	Cr	FGC		0.01-0.1
	Cu	FGC		0.03-0.15
	hg	FGC		0.001-0.01
	Ni	FGC		0.03-0.15
	Pb	FGC Treating hearth ash		0.02-0.06
	Sb	FGC		0.02-0.9
	Ti	FGC		0.005-0.03
	Zn	FGC		0.01-0.5
PCDD/F		FGC	ng I-TEQ/l	0.01-0.05

(1) The averaging periods have been defined in the section "General considerations". (2) BAT-AEL may not apply if the downstream waste water treatment plant is adequately designed and equipped to reduce the pollutants of concern, provided that this does not lead to an increase in the level of environmental pollution.
The associated monitoring is stipulated in BAT 6.

S.C. Friendly Waste Romania S.R.L. does not discharge wastewater directly into a receiving water body.

6. Material efficiency

The company will observe and enforce the provisions of the BATs:

BAT 35. In order to increase the efficiency of resource use, BAT consists of handling and treating flue ash separately from flue gas cleaning residues - not applicable to S.C. Friendly Waste Romania S.R.L. because it will not incinerate such waste.

BAT 36. In order to increase the resource efficiency of slag and bottom ash treatment, BAT consists of using an appropriate combination of the techniques indicated below, based on a risk assessment of the hazardous properties of the slag and bottom ash - not applicable to S.C. Friendly Waste Romania S.R.L. because it will not incinerate such waste.

Table 126 - BAT techniques to increase resource use efficiency in treating slag and bottom ash

	Technique	Description	Applicability	Applicability to S.C. Friendly Waste România S.R.L.
a)	Sieving and straining	Oscillating screens, vibrating screens and rotating screens are used for a first classification of hearth ashes by size before any further treatment.	Generally applicable	Not applicable
b)	Crushing	Mechanical treatment operations to prepare materials for metal recovery or for further use of these materials, for example in road construction and earthworks	Generally applicable	Not applicable

c)	Pneumatic sorting	Pneumatic sorting is used to sort the light and unburned fractions mixed in the hearth ash by blowing out the light fragments. A ballistic separator deck is used to transport the hearth ash to a disposal chute where the material falls through an air stream that blows the light unburned material, such as wood, paper or plastic, onto a disposal belt or into a container so it can be re-incinerated.	Generally applicable	Not applicable
d)	Ferrous and non-ferrous metal recovery	Different techniques are used, including: - magnetic separation for ferrous metals; - separation by eddy currents for non-ferrous metals; - separation by induction for all metals.	Generally applicable	Not applicable
e)	Ageing	The ageing process stabilizes the mineral fraction in the hearth ash by absorbing CO_2-of atmospheric carbonate (mineral carbonation), by draining excess water and by oxidation. After metal recovery, hearth ashes are stored outdoors or in covered buildings for several weeks, usually on an impermeable floor that allows drainage and run-off of the water to be collected for treatment. The inventories can be watered to optimize moisture content to promote salt leaching and mineral carbonation. Wetting the hearth ash also helps prevent dust emissions.	Generally applicable	Not applicable
f)	Washing	The washing of the hearth ashes allows the production of a material for recycling with minimal leachability of soluble substances (e.g. salts).	Generally applicable	Not applicable

7. Noise

The company observes and enforces the provisions of the BATs:

BAT 37. In order to prevent or, if this is not possible, reduce noise emissions, BAT consists of using one of the techniques listed below or a combination of them.

Table 127 - Applicable BAT techniques to prevent or, if not possible, reduce noise emissions

	Technique	**Description**	**Applicability**	**Applicability to S.C. Friendly Waste România S.R.L.**
a)	Appropriate location of equipment and buildings	Noise levels can be reduced by increasing the distance between transmitter and receiver and by using buildings as noise shields.	In the case of existing installations, relocation of equipment may be restricted by lack of space or excessive costs	Criterion met
b)	Operational measures	This includes: • improved inspection and maintenance of equipment; • closing doors and windows in enclosed areas if possible; • use of equipment by experienced personnel; • avoiding noise-generating activities at night, if possible; • provisions for noise control during maintenance activities.	Generally applicable	Criteria to be met
c)	Quiet equipment	These include compressors, pumps and silent fans	It will generally apply to the replacement of existing equipment or the installation of new equipment.	Criterion met
d)	Noise attenuation	Noise propagation can be reduced by placing obstacles between the transmitter and receiver. Appropriate obstacles include seawalls, dykes and buildings.	In the case of existing installations, the introduction of obstacles may be limited by lack of space	Criterion to be met

e)	Noise control equipment/ infrastructure	This includes: • noise reducers; • equipment insulation; • the indoor location of noise-producing equipment; • sound insulation of buildings	In the case of existing installations, applicability may be limited by lack of space	Criteria met

BAT techniques applied

1. General techniques

Table 128 - general BAT techniques used for waste incineration activity

Technique	Description
Advanced control system	The use of a computerised automatic control system to control combustion efficiency and support emission prevention and/or reduction. It also includes the use of high-performance monitoring of operating parameters and emissions.
Optimizing the incineration process	• Optimization of waste feed rate, waste composition, temperature, and primary and secondary combustion air flow rates and injection points to effectively oxidize organic compounds while reducing NOX. • Optimization of stack design and operation (e.g. in terms of flue gas temperature and turbulence, flue gas and waste stagnation time, oxygen level, waste agitation).

2. Techniques to reduce emissions to air

Table 129 - general BAT techniques used to reduce air emissions from waste incineration activity

Technique	Description	Applicability to S.C. Friendly Waste România S.R.L.
Bag filter	Bag filters or textile filters are made of a porous or soaked fabric through which gases pass to remove particles. If a bag filter is used, a fabric suitable for the flue gas characteristics and maximum operating temperature must be chosen.	criterion met by the IE 1000R-300 incinerator
Injection of sorbent into the boiler	Injection of magnesium or calcium-based absorbents at high temperatures into the afterburning zone of the boiler to achieve partial reduction of acid gases. The technique is very effective in eliminating SOX and HF and offers additional benefits in terms of capping peak emission levels.	Not applicable
Bag-type catalytic filters	Filter bags are either impregnated with a catalyst or the catalyst is mixed directly with organic material in the production of the fibers used for the filter medium. Such filters can be used to reduce PCDD/F emissions as well as, in combination with an NH3 source, to reduce NOX emissions.	Not applicable
Direct desulphurisation	Adding magnesium or calcium-based absorbents to the bed of a fluidized bed stack.	Not applicable
Dry adsorbent injection	Injection and dispersion of the adsorbent as a dry powder into the flue gas stream. Alkaline adsorbents (e.g. sodium bicarbonate, hydrated lime) are injected to react with acid gases (HCl, HF and SOX). Activated carbon is injected or co-injected to adsorb mainly in PCDD/F and mercury. The resulting solids are removed, most often with a bag filter. Excess reagents can be recirculated to reduce their consumption, possibly after reactivation by maturation or steam injection (see BAT 28 b).	Not applicable
Electrostatic precipitator	Electrostatic precipitators work by electrically charging particles and separating them under the influence of an electric field. These precipitators can operate in a wide variety of conditions. Reduction efficiency may depend on the number of fields, the dwell time (size) and the upstream particulate removal devices. Electrostatic precipitators generally include between two and five fields. These precipitators can be of the dry or wet type, depending on the technique used to collect the	Not applicable

	powders from the electrodes. Wet electrostatic precipitators are generally used in the polishing stage to remove residual powders and droplets after wet scrubbing.	
Adsorption in fixed bed or continuous motion bed	The flue gas passes through a fixed bed or moving bed filter where an adsorbent (e.g. active coke, active lignite or a carbon-impregnated polymer) is used to adsorb the pollutants.	Not applicable
Flue gas recirculation	Partial recirculation of flue gas to the stack to replace some of the fresh combustion air, this has the dual effect of cooling the temperature and limiting the O2 content for nitrogen oxidation, thus limiting NOX production. It involves directing the flue gases from the stack into the flame to reduce the oxygen content and therefore the flame temperature. This technique also reduces energy losses from flue gases. Energy savings are also achieved when recirculated flue gas is extracted before flue gas cleaning, as the flow of gas through the flue gas cleaning system is reduced and thus the size of the required flue gas cleaning system is reduced.	Not applicable
Selective catalytic reduction (RCS)	Selective reduction of nitrogen oxides with ammonia or urea in the presence of a catalyst. This technique is based on the reduction of NOX to nitrogen on a catalytic bed by reaction with ammonia at an optimum operating temperature, which is generally around the following values: 200-450°C for a high dust RCS unit location and 170-250°C for a tail end RCS unit location. Ammonia is generally injected as an aqueous solution; the ammonia source can also be anhydrous ammonia or a urea solution. Several layers of catalyst can be applied. Greater NOX reduction is achieved by using a larger surface area of the catalyst, installed as one or more layers. An "in-line" or "no-reaction pass" RCS system combines RNCS with downstream RCS that reduces ammonia leakage.	Not applicable
Selective non-catalytic reduction (RNCS)	Selective nitrogen reduction of nitrogen oxides with ammonia or urea at high temperatures and without catalyst. The operating temperature range is maintained between 800°C and 1,000°C for optimum reaction. The performance of RNCS system can be enhanced by controlling the injection of reagent from multiple lance injectors using an acoustic (rapid response) or infrared temperature measurement system to ensure that the reagent is injected in the optimum temperature zone at all times.	Not applicable
Semi-moistened absorbent	Also called semi-dry absorbent. An aqueous alkaline solution or alkaline suspension (e.g. whitewash) is added to the flue gas stream to catch acid gases. The water evaporates and the reaction products are dried. The resulting solids can be recirculated to reduce reagent consumption (see BAT 28 b). This technique includes a number of different models, including *flash-dry* processes, which consist of injecting water (resulting in rapid cooling of the gas) and reagent at the inlet to the filter.	Not applicable
Wet scrubber	The use of a liquid, usually water or aqueous solution/suspension, to adsorb pollutants from the flue gas, especially acid gases, as well as other soluble compounds and solids. To adsorb mercury and/or PCDD/F, carbon scrubber can be added to the wet scrubber (in paste form or as a carbon impregnated plastic package). Different types of scrubber designs are used, e.g. jet scrubbers, rotary scrubbers, Venturi scrubbers, spray scrubbers and distillation packed columns.	Not applicable

3. Techniques to reduce emissions to water

Table 130 - general BAT techniques used to reduce emissions to water from waste incineration activity

Technique	Description	Applicability to S.C. Friendly Waste România S.R.L.
Adsorption on activated coal	Removal of soluble substances (dissolved substances) from wastewater by transferring them to the surface of solid, highly porous particles (adsorbent). Activated coal is usually used for adsorption of organic compounds and mercury	Not applicable
Precipitation	Transformation of dissolved pollutants into insoluble compounds by the addition of precipitating agents. The solid precipitates formed are then separated by sedimentation, flotation or filtration. Typical chemicals used to precipitate metals include lime, dolomite, sodium hydroxide, sodium carbonate, sodium sulphide and organic sulphides. Calcium salts (other than lime) are used for the precipitation of sulphate or fluoride	Not applicable
Coagulation and flocculation	Coagulation and flocculation are used to separate suspended solids from wastewater and often take place in successive stages. Coagulation is achieved by adding coagulants (e.g. ferric chloride) with opposite charges to those of the suspended solids. Flocculation is achieved by adding polymers so that collisions of micro-flakes particles cause them to clump together to produce larger flakes. Subsequently, the flakes formed are separated by sedimentation, air flotation or filtration.	Not applicable
Equalisation	Balancing flows and pollutant loads using ponds or other management techniques.	Not applicable
Filtration	Separation of solids from wastewater by passing them through a porous medium. This includes different types of techniques, e.g. sand filtration, micro-filtration and ultra-filtration	Not applicable
Flotation	Separation of solid or liquid particles present in wastewater by attaching them to fine gas bubbles, usually air. Floating particles accumulate on the surface of the water and are collected by skimmers.	Not applicable
Ion exchange	Retaining ionic pollutants in wastewater and replacing them with more acceptable ions using an ion exchange resin. Pollutants are temporarily trapped and then released in a regeneration or backwash liquid.	Not applicable
Neutralization	Adjusting the pH value of wastewater to a neutral value (around 7) by adding chemicals. Sodium hydroxide (NaOH) or calcium hydroxide [Ca(OH)2] is generally used to increase pH, while sulphuric acid (H2SO4), hydrochloric acid (HCl) or carbon dioxide (CO2) is generally used to reduce pH. During the neutralization, some substances may precipitate out.	Not applicable
Oxidation	Conversion of pollutants by chemical oxidation agents into similar compounds that are less hazardous and/or easier to reduce. In the case of wastewater from wet scrubbing, air can be used to oxidize sulphite (SO32-) to sulphate (SO42-).	Not applicable
Reverse osmosis	A membrane-based process whereby a pressure difference will be applied between separate membrane compartments, causing water to flow from a more concentrated solution to a solution of lower concentration.	Not applicable
Sedimentation	Separation of suspended solids by gravity settling.	Decanting will be achieved in the 2 drainable concrete basins
Stripping	Removal of purgeable pollutants (e.g. ammonia) from wastewater by contact with a high flow of a gas stream to	Not applicable

	transfer them to the gas phase. The pollutants are then recovered (e.g. by condensation) for further use or disposal. Removal efficiency can be increased by increasing temperature or decreasing pressure.	

4. Management techniques

Table 131 - BAT management techniques used for waste incineration activity

Technique	Description	Applicability to S.C. Friendly Waste România S.R.L.
Odour management plan	The odour management plan is part of the environmental management system (see BAT 1) and includes: (a) a protocol for conducting odour monitoring in accordance with EN standards (e.g. dynamic olfactometry in accordance with EN 13725 to determine odour concentration); this may be supplemented by measurement/estimation of odour exposure (e.g. in accordance with EN 16841-1 or EN 16841-2) or by estimation of odour impact; (b) a protocol for responding to identified incidents involving the release of odours, e.g. complaints; (c) an odour prevention and abatement programme designed to identify the source(s) of odours, characterize source contributions and implement prevention and/or abatement measures	To be applied in the operational phase. after obtaining the AM
Noise management plan	The noise management plan is part of the environmental management system (see BAT 1) and includes: (a) a protocol for noise monitoring; (b) a protocol for responding to identified noise incidents, e.g. complaints; (c) a noise reducing programme designed to identify the source(s), measure/estimate noise exposure, characterize the contributions of the source(s), and implement prevention and/or reduction measures.	To be applied in the operational phase. after obtaining the AM
Accident management plan	The accident management plan is part of the environmental management system (see BAT 1) and identifies the hazards posed by the installation and the associated risks and defines measures to address these risks. The plan considers the inventory of pollutants that are present or likely to be present and which, if released, could have environmental consequences. It can be prepared using, for example, failure modes and effects analysis and/or failure modes, effects and criticality analysis. The accident management plan includes the creation and implementation of a risk-based fire prevention, detection and control plan, which includes the use of automatic fire detection and warning systems and manual and/or automatic fire intervention and control systems. The fire prevention, detection and control plan is particularly relevant for: • waste storage and pre-treatment areas; • stack loading areas; • electrical control systems; • bag filters; • fixed adsorption beds. The accident management plan shall also include, especially for facilities receiving hazardous waste, training programmes for personnel on: • explosion and fire prevention; • fire fighting;	To be applied in the operational phase. after obtaining the AM

	• knowledge of chemical hazards (labelling, carcinogens, toxicity, corrosion, fire).	

12. NON-TECHNICAL SUMMARY OF THE INFORMATION PROVIDED

In accordance with the provisions of Article 15 para. (7) of Annex 5 to Law 292/2018, the non-technical summary of the information provided in the environmental impact report includes the conclusions of the appropriate assessment study.

For the project under review, the appropriate assessment study was prepared by **Oana SAVIN**, certified expert - main level, holding the Certificate of Attestation series RGX, no. 450/25.01.2023 issued by the Romanian Environmental Association.

The project holder – SC FRIENDLY WASTE ROMANIA SRL – consists in the construction of a metal structure hall and the purchase and installation of a rotary incinerator for the incineration of medical and animal waste, in order to develop new incineration capacities for the geographical area comprising Giurgiu County and neighbouring counties, by equipping it with high performance equipment complying with the highest standards and technologies for environmental protection, with the reduction of waste transport distances between generators and processors.

Thermal waste treatment processes are a feasible option after recovery options (collection, sorting, recycling) and before controlled landfilling. Oxidation at high temperatures converts organic components into specific gaseous oxides, which are mainly carbon dioxide and water. The inorganic components are mineralized and transformed into ash.

The general purpose of waste incineration is:

1. minimizing the potential for risk and pollution;
2. reducing the amount and volume of waste;
3. conversion of the remaining substances into a form that allows their recovery or storage;
4. transformation and recovery of the energy produced.

The works to be carried out for the development of the company's activity and to ensure a technological flow in accordance with the legal provisions as well as to ensure maximum performance in terms of environmental protection will consist of:

→ construction of a hall made of coated sheet metal panels placed on a metal structure
→ purchase and installation in the technological flow of a waste incinerator type IE 1000R-300
→ purchase and installation in the technological flow of 2 cold rooms with V = 16 m3 each
→ purchase and installation of a weighing platform
→ purchase and installation
→ of a mobile scale for 1 t
→ purchase and installation in the technological flow of 4 LPG tanks of 10 m3 each
→ construction of concrete platforms
→ installation of a basin with V = 10 m3
→ construction of water supply and sewage networks
→ making a connection to the city drinking water network
→ making a connection to the city sewerage network.
→

The administrative location of the project site under analysis is in the inner urban area of Giurgiu municipality, in the south-western part of the municipality and in the central-northern part of the platform no. 2 of the former Giurgiu Chemical Combine.

The land area of the works is 3050,00 sqm.

According to the updated General Urban Plan of Giurgiu Municipality, approved by HCLM 37/2011, the land is located in subzone 11 - production, storage, construction area with buildings with maximum Gf + 3 levels and maximum height of 20.0 m (except for machinery accents), with discontinuous building regime: with various functions related to productive activities: storage, specialized services for production, distribution and marketing plus various services for staff and customers.

The implementation of the project involves the construction of lightweight, metal frame constructions, namely:

- metal posts for support
- metal trusses for roof construction
- metal frameworks
- side walls made of fireproof sandwich panels

All the light constructions will be placed on foundations to be built on site. The fixing of the pillars to the foundations will be achieved by connections with metal anchors that will be fixed, with anchor bolts, into the concrete.

The location of the incinerator and the technological annexes involves:

- making connections for fixing them to the concrete platform
- the achievement of technological lines for the fuel supply of burners
- the construction of electrical lines and connections
- location of the construction elements of incinerator

The activity to be carried out with the equipment to be installed is the incineration of non-hazardous animal waste and hazardous and non-hazardous medical waste.

An analysis based on the incineration capacity for non-hazardous animal waste and the incineration capacity for medical waste was carried out to determine the incineration capacity

For both types of waste the combustion capacity is 300 kg/h, respectively 7.2 t/day in continuous operation.

Incineration capacity of this type of incinerator, for the same volume of primary combustion chamber is given by:

- burner capacity
- waste supply rate
- rotational speed of the primary combustion chamber

The annual incineration capacity is calculated according to the hourly capacity, the daily capacity and the number of operating days/year:

0.3 t/h x 24 h = 7.2 t/day

7.2 t/day x 320 days/year = **2304 t/year**

This represents the total maximum incineration capacity for all types of waste.

The division of this capacity by type of waste will depend on the availability of waste categories for incineration (hazardous or non-hazardous medical waste, non-hazardous or non-hazardous animal waste) and on the incineration programme to be carried out (strictly during the operational phase of the incinerator, after obtaining the environmental permit and other permits required by the legal provisions in force).

The project owner proposes the use of a rotary incinerator for the incineration of medical and animal waste - type IE 1000R - 300, with the following technical characteristics:

- incineration capacity - 300 kg/h respectively 7200 kg/day in continuous operation
- fuel - LPG
- fuel consumption - 24.6 ÷ 122.5 l/h
- primary combustion chamber with the characteristics
  - primary combustion chamber volume = 10.5 m3
  - primary combustion chamber temperature - 850°C
  - 1 burner type P 61 on LPG
- secondary combustion chamber with features:
  - primary combustion chamber volume = 9.7 m3
  - primary combustion chamber temperature - 1100°C
  - 1 burner type P 61 on LPG
  - gas retention time in the secondary combustion chamber - 2 seconds
- volume of ash resulting - 3%
- measured emission parameters

The IE 1000R - 300 incinerators are equipped with state-of-the-art technology, both in terms of plant efficiency and environmental protection features.

The IE 1000R-300 model is modern and innovative in terms of waste incineration efficiency. This is an incinerator model with a controlled air supply system designed to ensure the best conditions for incinerating a very wide range of wastes, both hazardous and non-hazardous.

Friendly Waste Romania SRL will use these incinerators only for the incineration of non-hazardous waste, animal waste and hazardous and non-hazardous medical waste.

A) Taking into account the data presented above, the following conclusions can be drawn regarding **the impact of the incinerator activity on the air environmental factor:**

1. the direct impact is insignificant and is manifested in a very small area that does not go beyond the boundaries of the site
2. there is no indirect or secondary impact
3. there is no significant impact in the medium or long term due to the extremely low quantities of pollutants emitted into the atmosphere and due to the air currents, which contribute to their dispersion in a short time
4. the cumulative impact with the existing installations in the analyzed area is insignificant (even negligible) taking into account the fact that the emissions from the incinerator activity are at totally negligible values
5. the cross-border impact is insignificant to neutral in all respects (direct, indirect, secondary, cumulative, short/medium/long term, temporary, permanent) whereas:
   - the amounts of air pollutants emitted from the operation of the incinerator are low and within legal limits
   - there are no areas of air pollutant propagation with excesses of the permissible limit values for pollutant concentrations and the nearest boundary point is 3317 m from the flue gas stack of the analyzed incinerator.

B) **The conclusions on the impact of the project on population and human health** are as follows:

Given the specifics of the project, the construction of an incinerator for hazardous and non-hazardous waste, the population and human health are likely to be affected by the project, which is why particular attention will be paid to these issues.

The land proposed for the implementation of the project is located inside the Industrial Platform 2 of the former Giurgiu Chemical Combine. The foundations of the chemical plant buildings are on the site. The entire industrial platform is unhealthy, with foundations and/or buildings in an advanced state of decay, abandoned waste, spontaneous vegetation.

The industrial platform is included in the Local Urban Planning Regulation (RLU) for the General Urban Plan (PUG) of Giurgiu municipality, in subzone I1 - PRODUCTION, STORAGE ZONE where productive industrial and service activities are allowed.

On the eastern side, the industrial platform has a "protection zone" of the$_{LM2}$residential function area, i.e. subzone I3 - SUBZONE OF PRODUCTION AND STORAGE ADJACENT TO ADJACENT PROTECTED FUNCTIONS.

In accordance with the provisions of Art. 11 para. (1) of the Rules of hygiene and public health on the living environment of the population, approved by Order of the Minister health No. 119/2014, as amended, the minimum health protection distance between protected territories and the perimeter of establishments causing discomfort and risks to the health of the population is 500 m in the case of incinerators for hazardous and non-hazardous waste.

The location of the project (perimeter of the unit) in relation to the "protected territories" as defined in the normative act is more than 500 m away, taking into account the definitions of the terms "protected territory", "settlement area" and "perimeter of the unit" as follows:

- ***protected territory*** - territory in which the maximum permissible concentrations of physical, chemical and biological pollutants in environmental factors may not be exceeded; it includes residential areas, parks, nature reserves, areas of balneoclimatic, rest and recreational interest, social-cultural, educational and medical institutions
- ***residential area*** - an area constituted as a functional grouping of territorially delimited lots and parcels of land **on which residential buildings predominate, with average housing density as a parameter of measurement**
- ***perimeter of the unit*** - the boundaries of the land on which an objective is located and on which specific activities are carried out

According to Google Earth measurements, the distance from the incinerator's chimney to the nearest house (located on Str. Drumul Catunului), is 535 m.

The dwellings at the end of the str. Drumul Catunului, towards the site under analysis, is not in the "residential area" defined above, given that the "residential area", in the meaning of the normative deed, implies the existence of several lots and parcels delimited territorially on which residential buildings are built and predominate, having as a measurement parameter the average density of housing. In the area where the nearest dwelling to the project site is located, as far as the "living area" (which includes the dwellings from the intersection of the str. Drumul Catunului with str. Cocorului), there are only four dwellings on the lots and plots of land, and vacant land predominates.

Consequently, the area in which the nearest dwelling is located in relation to the site proposed for the implementation of the project does not fall within the legal definition.

The distance between the perimeter of the unit and the living area, within the meaning of the legal provisions, is 570 m.

Also, according to the provisions of Article 43 letter a) - "*Waste incineration plants shall meet the following conditions: a)* ***the location and establishment of the protection area shall be made following environmental and health impact studies***". For this reason, Giurgiu Public Health Directorate has requested the elaboration of a health impact study.

The conclusions of the "Impact assessment study on the health and comfort of the population" prepared by IMPACT SANATATE SRL Iasi for the proposed project are the following: "*Corroborating the previous conclusions, we consider that* ***the activities to be carried out within this***

investment objective will not negatively affect the comfort and health of the population in the area. We consider that the investment objective can have a positive socio-economic and administrative impact in the area**, and that any negative impact on the health of the population can be avoided by respecting the listed conditions [...] **A perimeter fence of trees and shrubs (hedge) will be created around the site".

Consequently, the investment that will be implemented will in no way worsen the situation already existing and assumed by the inhabitants in the vicinity of the industrial platform.

Through the measures to protect the environmental factors mentioned in this study and in the study of the impact assessment on the health of the population, emissions will be below the emission limit values, odours will be perceived strictly in the area of the incinerator, the perimeter of the site will be surrounded by trees and shrubs. The investment will not create discomfort for the inhabitants of the str. Drumul Catunului.

Access to the objective, both during implementation and operation, will be from Slobozia Road, without affecting the population in the eastern part of the site through traffic noise and emissions of particulate matter and exhaust gases.

If animal waste is to be handled, the rules for transporting it from the generator to the incinerator must be strictly observed and a cold room must be used for temporary storage until it is incinerated, to avoid generating odours that could have a negative impact on the population.

C) **Emission concentration values for different averaging periods for pollutants**: organic substances in gaseous or vaporous state, expressed as total organic carbon (COT), hydrochloric acid (HCl), hydrofluoric acid (HF), total particulate matter (TSP), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) - for half-hour and 24-hour averaging periods, as well as dioxins and furans for the 8-hour averaging period, **are below the emission limit values (VLEs)** of Annex 6, Law 278/2013 on industrial emissions, both for the situation of incinerator operation with additional air supply and without additional air supply.

D) All actions/activities to be carried out, both in the construction and in the operation phase, will be characterized, in terms of their impact on environmental factors, by:
- duration of manifestation
  - project implementation period - very short duration
  - period of operation of the investment - short term
- frequency of occurrence
  - project implementation period - only until completion of the investment
  - the period of operation of the investment - during the activities on the site, according to the profile
- impact reversibility
  - project implementation period - reversible
  - investment operating period - reversible

E) **The conclusions of the proper evaluation study** are as follows:

The location of the proposed project is represented by an area of land located in the premises of the former Giurgiu Chemical Combine, at a distance of approx. 1430 m from the Special Avifaunistic Protection Area ROSPA0108 Vedea - Danube.

The protected natural area of Community interest ROSPA0108 Vedea - Danube is located in the lower basin of the Vedea river and is part of the Lower Danube Plain. The site includes both the area of the lower basin of the river Vedea and the Danube stretch from Năsturelu to near Giurgiu together with its meadow. The Special Protection Area for Birds ROSPA0108 Vedea - Danube is important for the conservation of a rich avifauna, with species nesting, wintering or just transiting the site due to its position close to the Central European-Bulgarian migration route. During the migration

*period, the area is crossed by very large flocks of **water-related bird species,** which feed or rest in the site.*

Where species movement depends on ensuring population connectivity or providing food resources (e.g. in the case of highly mobile species such as birds), they may use a variety of habitats both within and outside the protected area.

The location of the proposed project is represented by an area of land located in the premises of the former Giurgiu Chemical Combine, in the area there are no habitats preferred by bird species for which ROSPA0108 Vedea - Danube has been declared.

From the observations made in the 4 observation points we can conclude that the number of bird species observed is not very high, the species being components of the specific fauna of the anthropic areas.

On the open steppe vegetation, characteristic steppe bird species and common species such as: Corvus monedula, Pica pica, Streptopelia decaocto or Passer montanus.

*During the field trips, in the area of the project site **"Construction of a hall building, concrete drainable basin, concrete platforms, fencing, lighting system, execution of drilling and internal network for water supply and sewage, installation of wastewater pre-treatment station, installation of medical waste incinerator with related facilities"** no bird species listed in Annex I of Council Directive 2009/147/EC, for which the Special Protection Area for Birds ROSPA0108 Vedea - Danube was declared, were observed.*

In terms of vegetation, the project site, with a total area of 3,050 square meters, is partly concreted and partly land with herbaceous vegetation, developed following the abandonment of activities previously carried out in the former Giurgiu Chemical Combine.

The dominant plant association is Poëtum pratensis Răv., Căzac. et Turenschi 1956, which forms meso-hygrophilous meadows with a rich species composition, dominated by Poa pratensis together with Agrostis sp., Festuca sp., Alopecurus pratensis, Trifolium repens, Trifolium pratense, Ranunculus repens etc.[59]

In addition to the specific phytocenic composition, shrub species such as Rosa canina are present in the field.

Taking into account the above mentioned aspects and the location of the project in the premises of the former Giurgiu Chemical Combine, at a distance of approx. 1430 m from the protected natural area of Community interest, we consider that the project "CONSTRUCTION OF HALL BUILDING, VIDANJABLE CONCRETE BASIN, CONCRETE PLATFORMS, FENCING, LIGHTING SYSTEM, EXECUTION OF DRILLING AND INTERNAL WATER SUPPLY AND SEWER SYSTEM, EXPANSION OF WASTEWATER PRETREATMENT STATION, EXPANSION OF MEDICAL WASTE INCINERATOR WITH ANNEXED FACILITIES", alone or in combination with other projects, is not likely to significantly affect the Special Protection Area for Birds ROSPA0108 Vedea - Danube.

Provided that the project and the technical operating rules are respected, together with measures to prevent and reduce pollution of environmental factors and biodiversity, the impact is assessed as moderate to minor.

The implementation of the proposed project will not generate fragmentation of lake habitats, will not destroy structural or functional relationships within the protected area, will not jeopardize its integrity and will not affect the feeding, breeding or migration areas of the bird species mentioned in the NATURA2000 Standard Form of ROSPA0108 Vedea - Danube.

F) From the perspective of the prohibited uses according to the Local Urban Planning Regulation related to the PUG, on the site proposed for the analyzed project, namely "productive polluting activities or with technological risk", the conclusions of the environmental impact report highlight the fact that **the project proposed by FRIENDLY WASTE RAMANIA SRL does not fall under "productive polluting activities or with**

[59] Habitats in Romania, Nicolae Donita et. al, Technical Forestry Publishing House, Bucharest 2005

technological risk" provided that the solutions proposed in the project and the measures to avoid, mitigate (prevent and/or reduce) the negative effects on the environment identified and presented in this study and in the study of impact assessment on the health of the population prepared for the project are strictly observed.

The conclusions of the study are based on information and documents received from the project owner, observations during site visits to the proposed project site, and analysis of sources used for the descriptions and assessments included in the report, as listed in the following chapter.

13. REFERENCE LIST

The reference list includes the sources used for the descriptions and assessments included in the report (including software, databases, legislation, other studies/documents, plans/projects):

→ Geological Map of Romania, scale 1: 200.000, available at www.geo-spatial.org;
→ The results of the 2011 Population and Housing Census, available on the website recensamantromania.ro;
→ Maniu M., 2004, Ecology and environmental protection, Bioterra University, Bucharest;
→ Report on the economic, social and environmental situation of Giurgiu municipality, Giurgiu county, for the year 2019;
→ The General Urban Plan and the Local Urban Planning Regulation of Giurgiu Municipality, approved by the Decision of the Local Council of Giurgiu Municipality no. 37/2011, extended by the Decision of the Local Council of Giurgiu Municipality no. 89/2021;
→ Impact assessment study on the health and comfort of the population for the investment objective proposed by the holder, prepared by IMPACT SĂNĂTATE SRL Iasi;
→ Geotechnical study, elaborated by OMEGA PROIECT CONSTRUCT SRL;
→ Project DTAC phase, developed by ARHI PLUS SRL;
→ Technical memorandum - water and sewage installations, calculation abstract, prepared by DM Fluid Proiect SRL;
→ Esri ArcGIS 10.4
→ QGIS 3.18.0-Zürich
→ Google Earth Pro
→ TransDatRO v. 4.07
→ Aloha
→ AERMOD and AERMET
→ WEATHERLINK IP (weather station software)
→ DT - 8852 SOUND LEVEL METERS (soft sound level meter)
→ IMMI (noise mapping software)
→ GIS databases (NATURA2000 site boundaries, boundaries of administrative territorial units, county boundaries, Geological Map of Romania scale 1:200000, etc.)
→ INMH weather archive
→ other documentation/information provided by the beneficiary
→ request of Giurgiu Environmental Protection Agency by Letter no. 1785/1480/2021/S.A.A.A./27.02.2023

Legislation:

- → Law no. 292/2018 on assessing the impact of certain public and private projects on the environment.
- → Law No. 278/2013 on the industrial emissions;
- → G.E.O. no. 195/2005 on environmental protection, Art. 11, paragraph (2), with further amendments and completions;
- → G.D. 188/2002 on the approval of certain rules on the conditions for discharging waste water into the aquatic environment amended by H.G. no. 352/2005;
- → G.E.O. no. 92/2021 regarding the regime of waste, with further amendments and completions;
- → Ordinance no. 2/2021 on waste disposal;
- → STAS 12574/1987 - On air in protected areas;
- → GEO no. 57/2007 on the regime of protected natural areas, conservation of natural habitats, wild flora and fauna, with further amendments and completions, and the Law on hunting and protection of hunting grounds no. 407/2006;
- → Order 19/2010 approving the Methodological Guide on the appropriate assessment of the potential effects of plans or projects on protected natural areas of Community interest;
- → Regulation (EC) No. 842/2006 of the European Parliament and of the Council of 17 May 2006 on certain fluorinated greenhouse gases:
- → ORDER No. 756 of 3 November 1997 approving the Regulation on the assessment of environmental pollution;
- → G.D. 930/2005 for the approval of the Special Rules on the character and size of the sanitary and hydrogeological protection zones,
- → Commission Implementing Decision (2014/895/EU) establishing the format for the transmission of information referred to in Article 21(3) of Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving hazardous substances;
- → Commission Decision 2014/955/EU of 18 December 2014 amending Decision 2000/532/EC establishing a list of wastes pursuant to Directive 2008/98/EC of the European Parliament and of the Council on the record of waste management and approving the list of wastes, including hazardous waste;
- → Law 59/2016 on the control of major accident hazards involving hazardous substances;
- → Commission Implementing Decision of July 11, 2011 on the standard format for Natura 2000 sites, as amended by C(2011) 4892 (2011/484/EU).

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14. ANNEXES

- Annexes submitted with version 1 of the RIM will be used.

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