

Report

Evaluation of Changed Emission Limit Values (LV-Exception) in the Course of the Environmental Impact Assessment

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**Evaluation of Changed Emission Limit Values (LV-Exception) in the Course of the
Environmental Impact Assessment
ALPACEM Cement, Anhovo**

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1. Introduction

Stricter emission limits in environmental legislation demand a new evaluation assessment of their impact in the ongoing Environmental Impact Assessment (EIA) of Alpacem Anhovo for the existing Phase I operations (see Jost and Uhrner 2022 [1]).

Building on previous modelling and environmental assessments [1], the effects of varying NO_x, Hg, CO, TOC and NH₃ emissions (see Table 1) from a planned prolonged stack with higher exhaust gas temperature as before must now be reassessed. The emission values *LV-EXC* (Limit Value – Exception) represent the new levels in Table 1. The additional loads of NO₂, Hg, CO, TOC and NH₃ will be evaluated and documented through air pollution maps and receptor point analyses at the monitoring locations in Gorenje Polje, Morsko, Deskle, and Gorenje Polje Vodarna.

Table 1: New emission levels for main stack for CS1

<u>Parameter</u>	<u>LV Exception</u> <u>(LV – EXC)</u>	<u>Mass flow</u>
<u>unit</u>	<u>mg/Nm3</u>	<u>kg/h</u>
NO _x	200	86.0
Hg	0.03	0.0129
CO	100	43
TOC	12	5.16
NH ₃	30	12.9

A detailed description of the modelling area, the methods applied for dispersion calculations and NO-NO₂ conversion, the derivation of background concentrations etc. see in [1].

2. Emission data

The new emission values are assigned to the main stack 'CS1'. Note, the technical parameters such as stack height and exhaust gas temperature differ from those used in the previous calculations [1].. The new parameters are listed in Table 2.

Table 2: New technical data of main stack CS1

Name	xcoord	ycoord	Height	Exit Vel. [m/s]	Exit Temp [°C]	Stack diameter [m]	Annual operating hours
CS1	393847.25	5102380.66	105	11	170	4.82	7014

In Table 3 stack CS1 emission data are listed for operation with new emission limits. The abbreviation *LV-EXC* stands for *Limit Value – Exception* (Deviations from the prescribed emission limit values due to the technology employed in the cement plant).

Table 3: Emission data of relevant pollutants

Stack CS1	NO _x [kg/h]	Hg [kg/h]	CO [kg/h]	TOC [kg/h]	NH ₃ [kg/h]
<i>LV-EXC</i>	86	0.0129	43	5.16	12.9

3. Results of dispersion simulation

The additional concentration load of NO₂, CO, Hg, NH₃ and TOC is assessed for the operation of stack CS1 for emission *LV-EXC* (Limit Value Exception). The pollutants NH₃ and TOC are assumed to be inert in the simulation. Results are shown in form of air pollution maps and as receptor point evaluations at the air quality monitoring sites.

3.1. Nitrogen dioxide (NO₂)

For the assessment of the additional annual mean NO₂ concentration load, the NO to NO₂ conversion must be estimated. Therefore, the background concentration was derived from measurement data. A background concentration of 11.3 µg/m³ for the annual mean value and 13.3 µg/m³ for the NO₂ 98 percentile value was assigned. Further details about the monitoring and NO to NO₂ conversion are found in Jost and Uhrner, 2022 [1].

Air quality assessment for *LV-EXC* NO_x emissions

For the *LV-EXC* emission scenario an annual mean NO₂ additional load of about 2 to 4 µg/m³ is calculated in the area of investigation (Figure 1). Additional loads of the NO₂ hourly mean value range up to 65 µg/m³ (Figure 2).

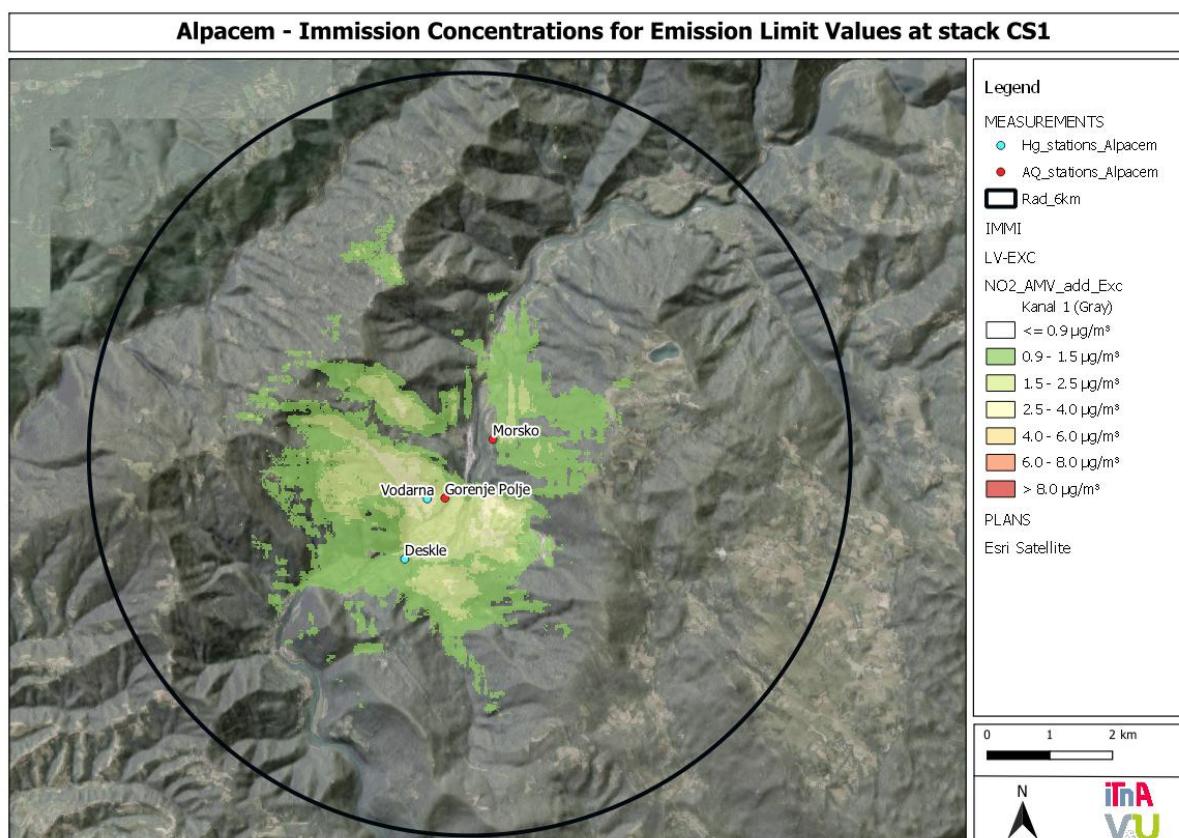


Figure 1: Simulated average NO₂ annual additional load, *LV-EXC* scenario.

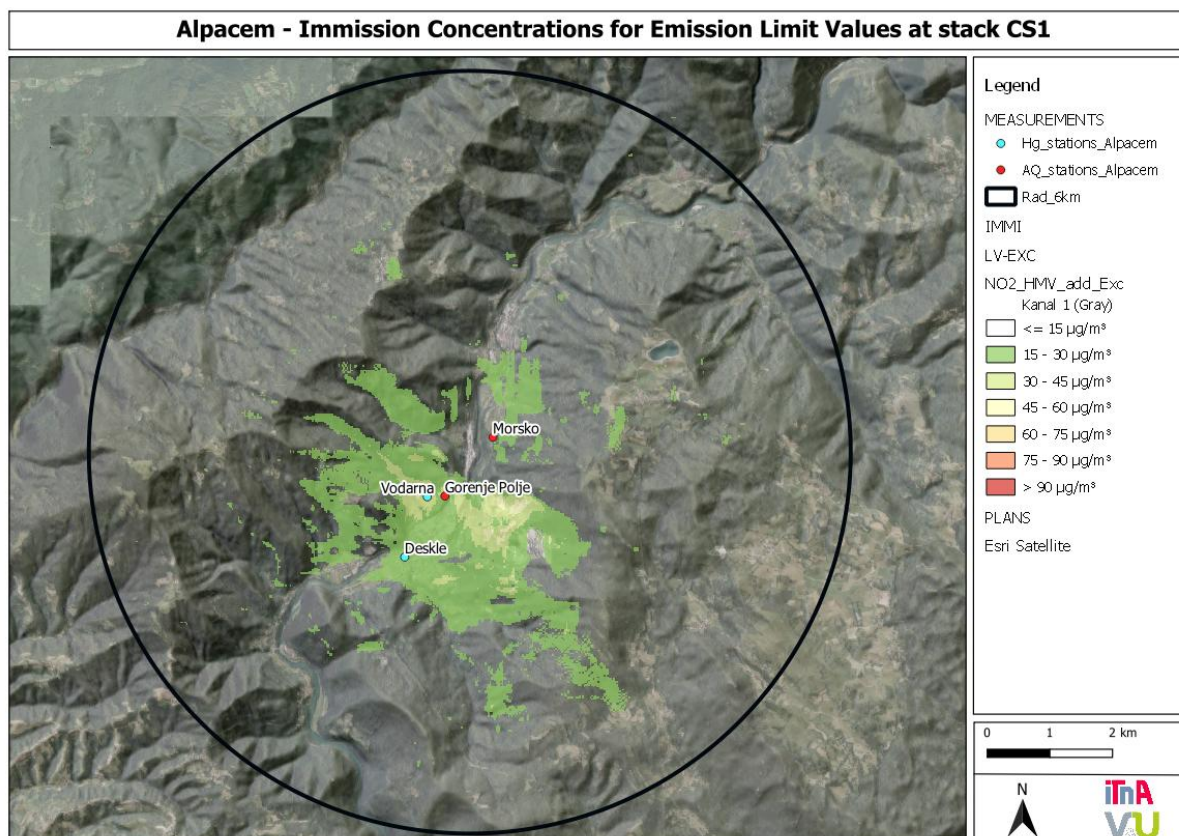


Figure 2: Simulated additional maximum hourly NO₂ load, LV-EXC scenario.

Receptor point evaluations

In Table 4 the NO₂ additional load concentration values at the air quality monitoring sites are listed.

Table 4: Simulated values at the receptor points for the annual mean value of NO₂

Name	NO2 additional load [µg/m ³]	
	AMV	HMV
Gorenje Polje	2.4	30
Morsko	0.6	14
Deskle	1.3	17

3.2. Carbon monoxide (CO)

For carbon monoxide the additional load of maximum hourly mean was evaluated.

Air quality assessment for LV-EXC CO emissions

The calculated maximum hourly CO additional load (max. HMV) is shown in Figure 3 and ranges up to a maximum of 80 µg/m³.

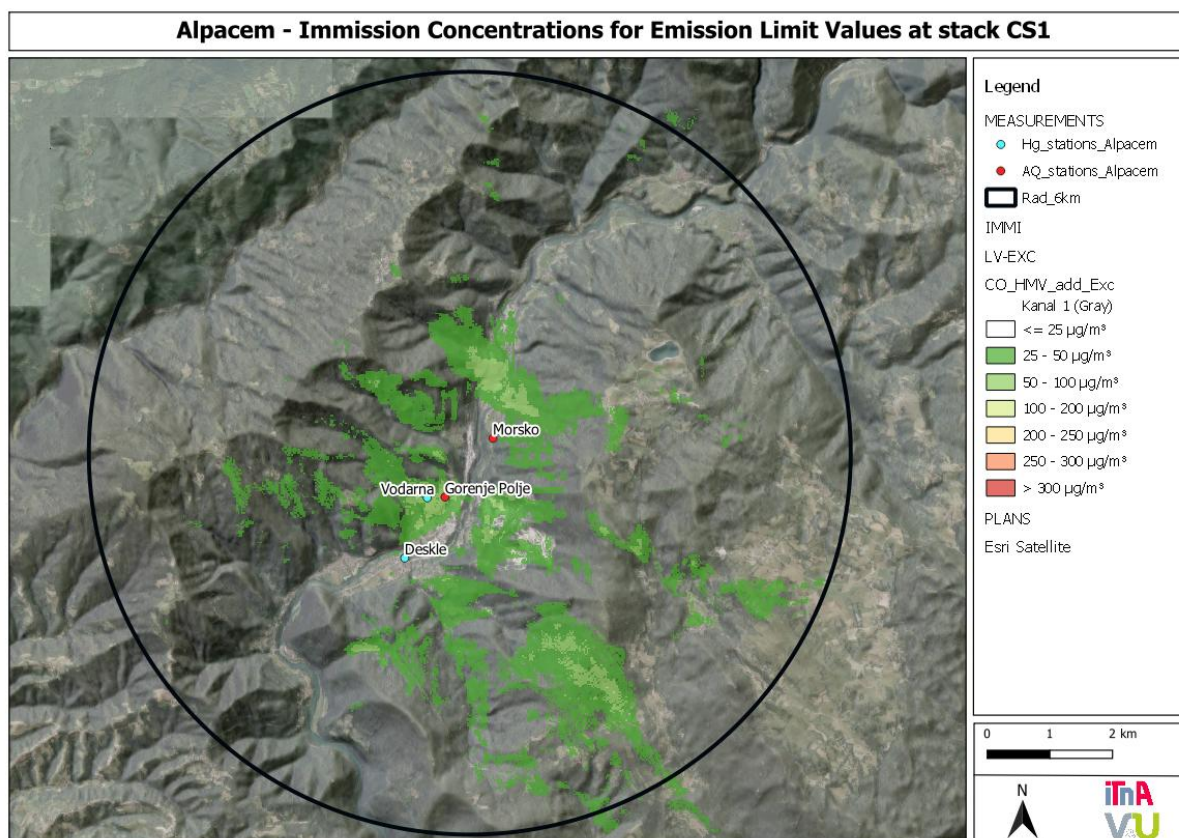


Figure 3: Simulated additional maximum hourly CO load, LV-EXC scenario.

Receptor point evaluations

In Table 5 the concentration values of the additional load of CO at the measurement sites are listed.

Table 5: Simulated values at the receptor points for the maximum hourly mean of CO

Name	CO HMV additional load [µg/m³]
Gorenje Polje	80
Morsko	16
Deskle	22

3.3. Mercury (Hg)

The additional loads for total gaseous mercury are assessed for the annual mean value and for the maximum hourly mean value.

Air quality assessment for LV-EXC Hg emissions

The result for the annual mean Hg additional load of LV-EXC emission scenario is shown in Figure 4. Calculated values reach up to 0.9 ng/m³ at single points in the area of investigation. In a more wide-spread area values up to 0.5 ng/m³ are assessed.

For the maximum hourly mean Hg additional load, concentrations reach up to about 40 ng/m³ (see Figure 5).

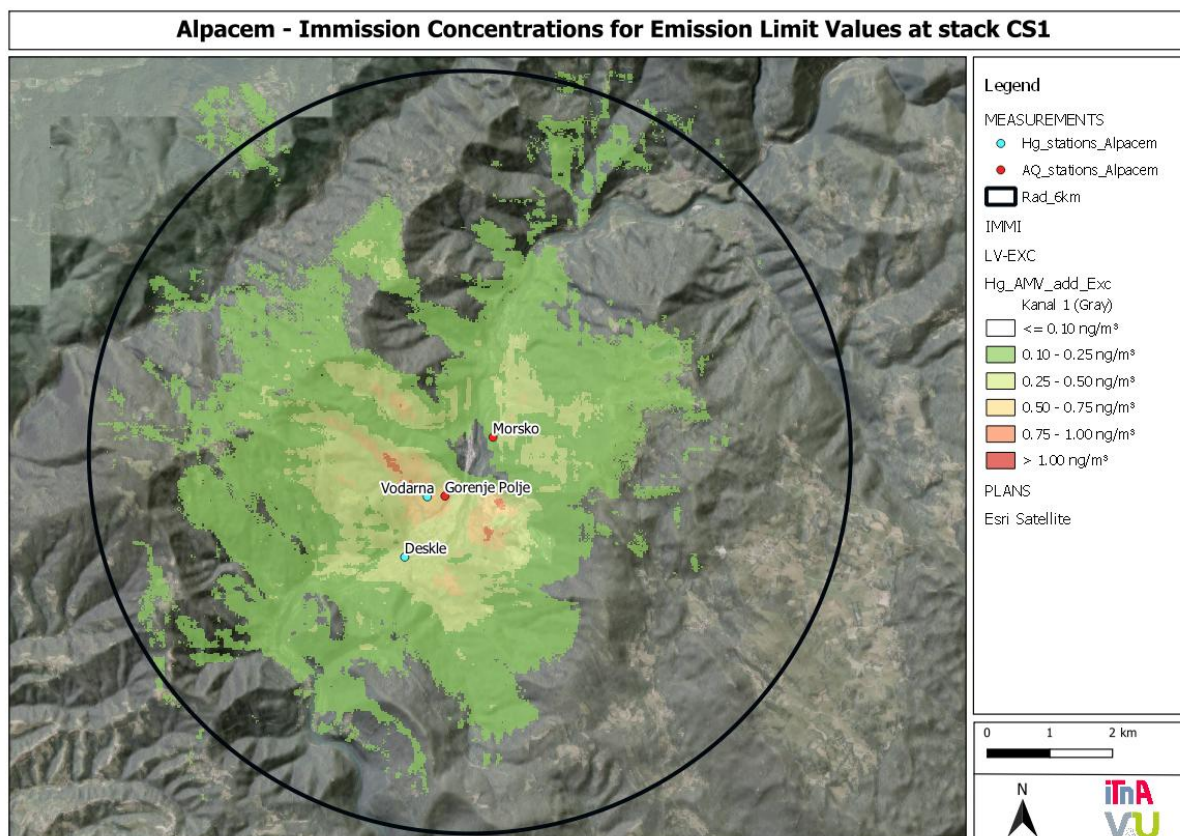


Figure 4: Simulated average annual Hg additional load, LV-EXC scenario.

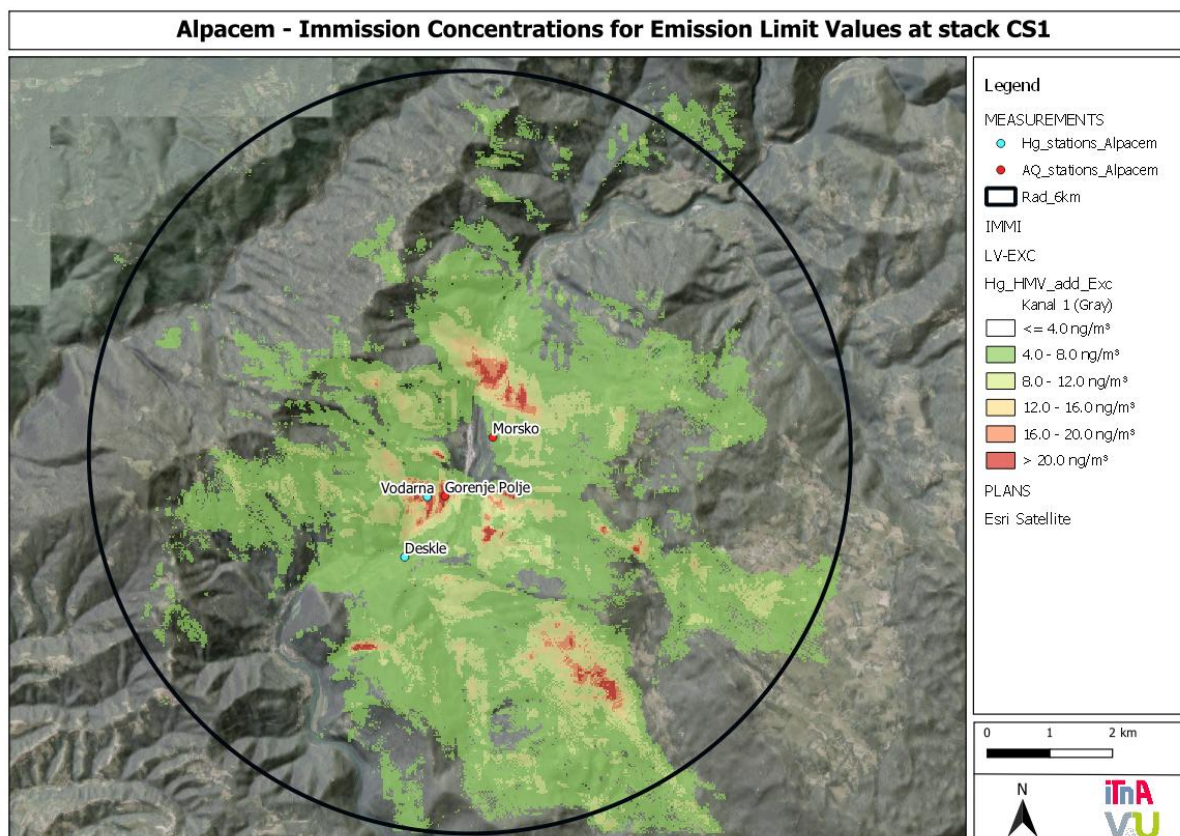


Figure 5: Simulated additional maximum hourly Hg load, LV-EXC scenario.

Receptor point evaluations

In Table 6 the concentration values of the additional load of Hg at the air quality monitoring sites are listed.

Table 6: Simulated values at the receptor points for the annual mean value of Hg

Name	Hg AMV additional load [ng/m ³]	
	AMV	HMV
Gorenje Polje	0.54	24.04
Morsko	0.14	4.70
Deskle	0.30	6.58
Gorenje Polje Vodarna	0.69	26.47

3.4. Ammonia (NH₃)

In the dispersion calculation, the pollutant NH₃ was assumed to be inert. Chemical transformation processes were not taken into account. Hence, the computed concentration fields are conservative. NH₃ was not considered in Phase-I computations.

Air quality assessment for LV-EXC NH₃ emissions

For the LV-EXC emission scenario an annual mean NH₃ additional load of about 0.5 µg/m³ is assessed in a larger area and values up to about 1 µg/m³ are calculated in small areas (Figure 6).

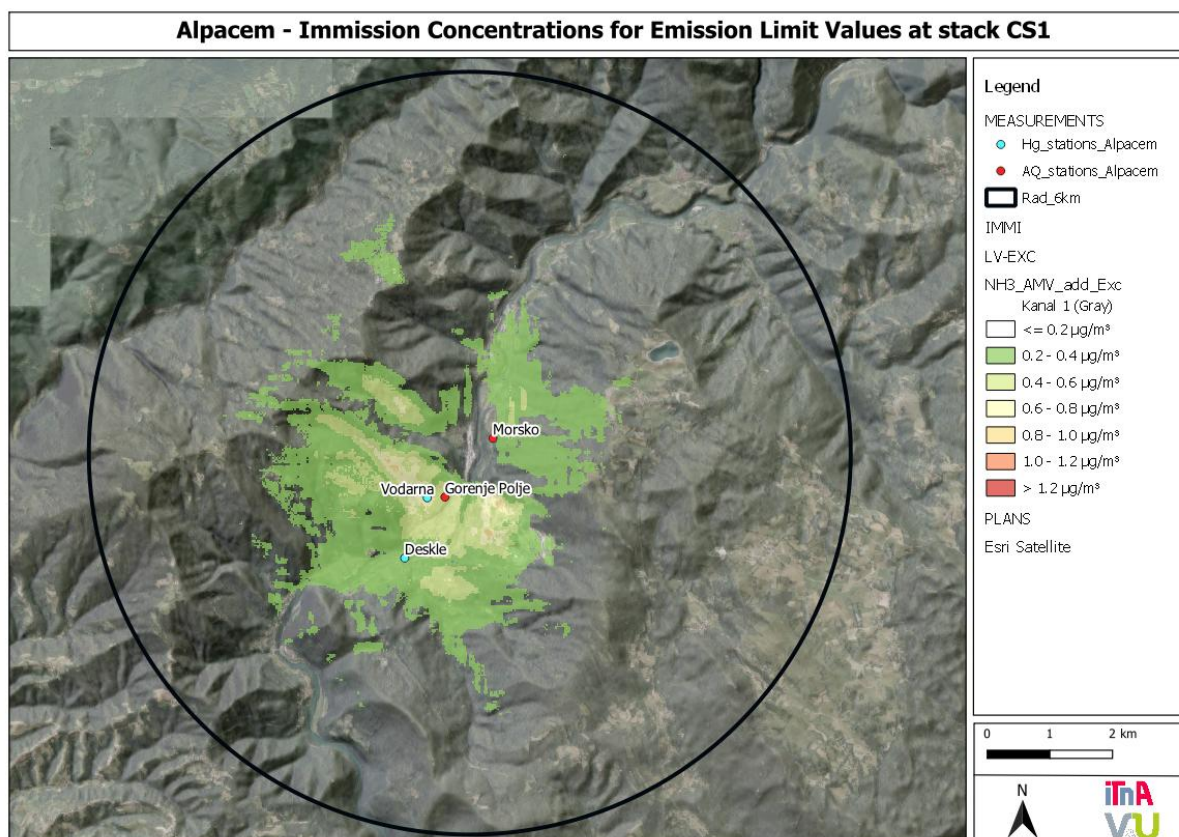


Figure 6: Simulated average NH₃ annual additional load, LV-EXC scenario.

Receptor point evaluations

In Table 7 the NH₃ additional load concentration values at the air quality monitoring sites are listed.

Table 7: Simulated values at the receptor points for the annual mean value of NH₃

Name	NH ₃ AMV additional load [µg/m ³]
Gorenje Polje	0.54
Morsko	0.14
Deskle	0.30

3.5. Total Organic Carbon (TOC)

In the dispersion calculation, the pollutant TOC was assumed to be inert. Chemical transformation processes were not taken into account.

Air quality assessment for LV-EXC TOC emissions

For the LV-EXC emission scenario an annual mean TOC additional load of up to 0.4 µg/m³ is calculated in the area of investigation (Figure 7).

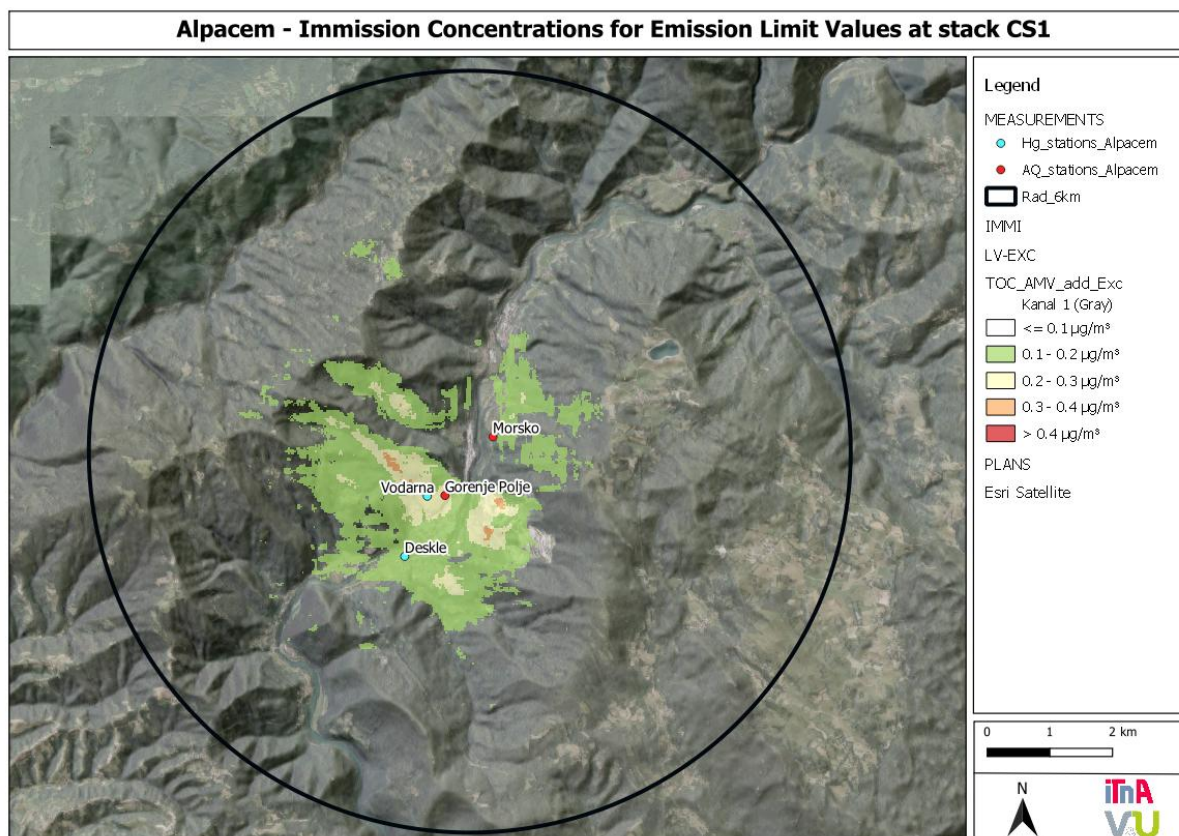


Figure 7: Simulated average TOC annual additional load, LV-EXC scenario.

Receptor point evaluations

In Table 8 the TOC additional load concentration values at the air quality monitoring sites are listed.

Table 8: Simulated values at the receptor points for the annual mean value of TOC

Name	TOC AMV additional load [$\mu\text{g}/\text{m}^3$]
Gorenje Polje	0.22
Morsko	0.06
Deskle	0.12

4. Summary

Dispersion calculations were conducted using the same model and basic input data as in previous assessments of emissions from the cement plant, as detailed in the *Final Report 2022 – Phase I (current operations) and Phase II (future operations following the initial phase of the green transition)* [1]. However, in this set of new calculations for stack CS1 with an increased stack height and a higher exhaust gas temperature for NO_2 , CO, Hg, NH_3 and TOC were performed for a changed emission level. The adjusted emission values LV-EXC (Limit Value – Exception) represent the new emission levels. The simulated additional immission loads are summarized in Table 9.

Table 9: Summary of the simulation results for additional loads of NO_2 , CO, NH_3 , TOC and Hg based on LV-EXC emission scenario

Name	NO_2 AMV	NO_2 HMV	CO HMV	NH_3 AMV	TOC AMV
LV-EXC	additional load [$\mu\text{g}/\text{m}^3$]				
Gorenje Polje	2.4	30	80	0.54	0.22
Morsko	0.6	14	16	0.14	0.06
Deskle	1.3	17	22	0.30	0.12

Name	Hg AMV	Hg HMV
LV-EXC	additional load [ng/m^3]	
Gorenje Polje	0.54	24.0
Morsko	0.14	4.7
Deskle	0.30	6.6
Gorenje Polje Vodarna	0.69	26.5

5. List of abbreviations

AMV Annual mean value
 HMV Hourly mean value

6. References

- [1] Jost, S. and Uhrner U., Dispersion calculations for Environmental Impact Assessment Salanit Anhovo, Phase I & Phase II, Report No. I-12/22/SJo V&U Inst-21/04/630 V2.0 from 18.08.2022

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