

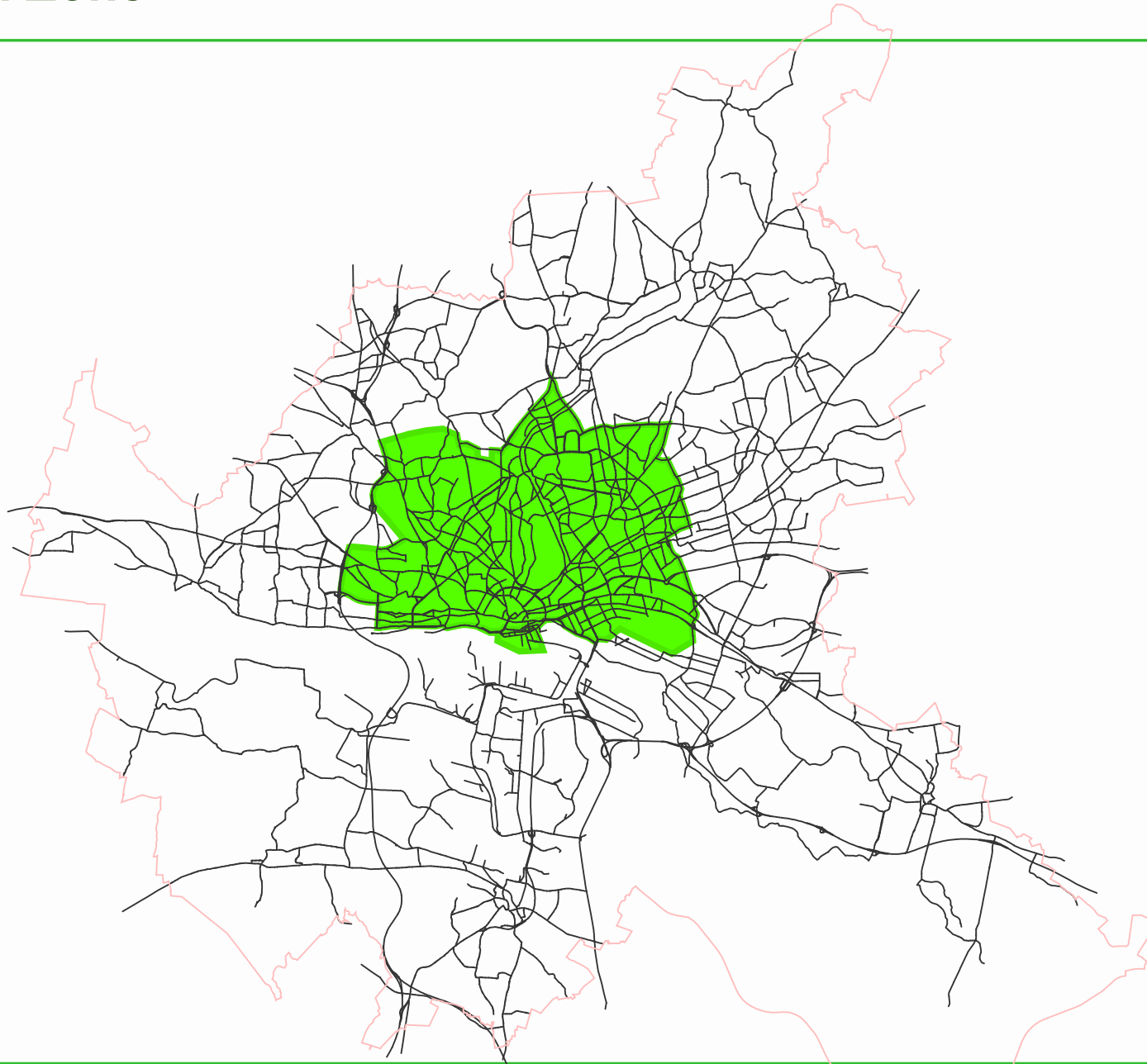
Calculating Vehicle traffic emission and concentrations Scenario Lower emission zone Hamburg NO₂ and PM10

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- Vehicle Emission Factors HBEFA 3.1
[HBEFA - Handbook Emission Factors for Road Transport](https://www.hbefa.net/)
<https://www.hbefa.net/>
- Dispersion model: Screening for Street Canyons
SELMA GIS PROKAS (VDI-Richtlinie 3782 Blatt 1)
- Considered Substances:
NO₂ and PM10
- Evaluation according EU Directive and 39. BImSchV

Calculated Scenarios:

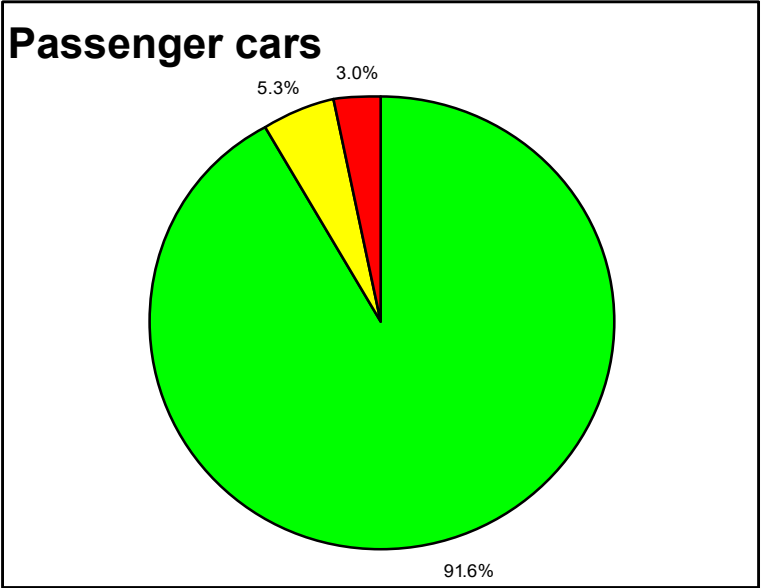
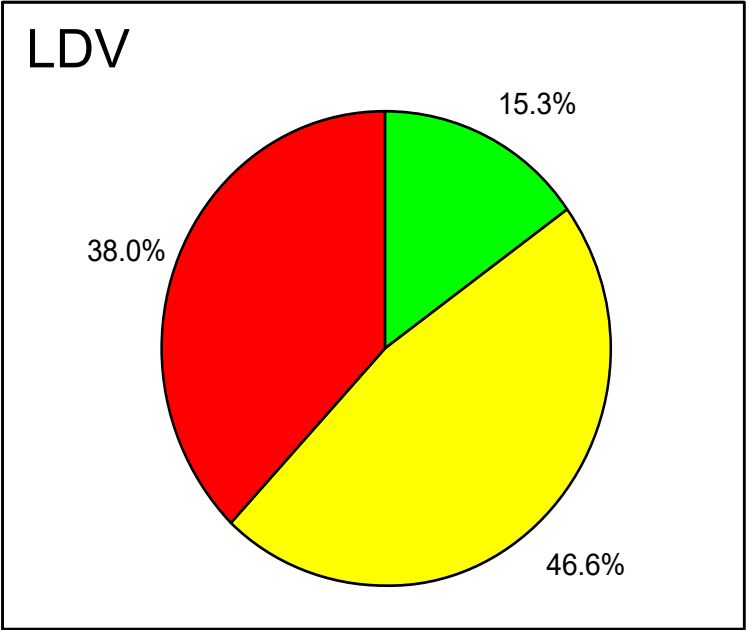
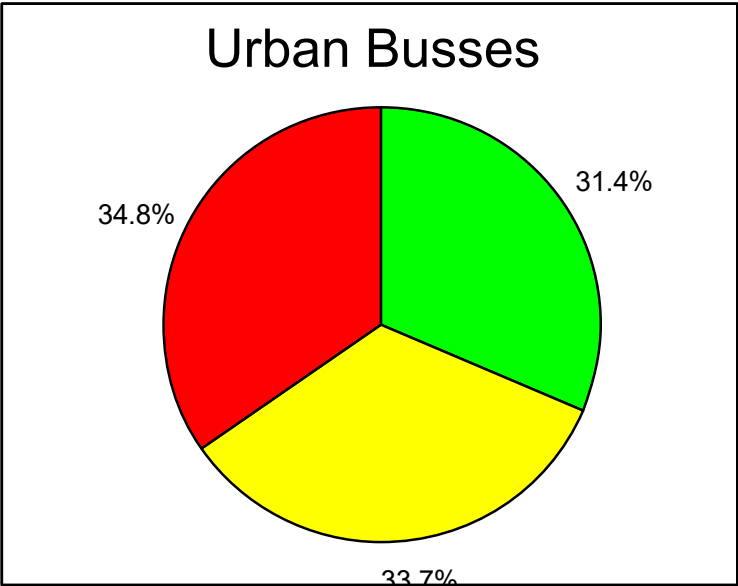
- Current State, reference year 2009
- Zero-case , reference year 2011
- Lower Emission Zone Traffic, reference year 2011
 - only green sticker
 - Reduction traffic density in the Lower Emission zone 2 %

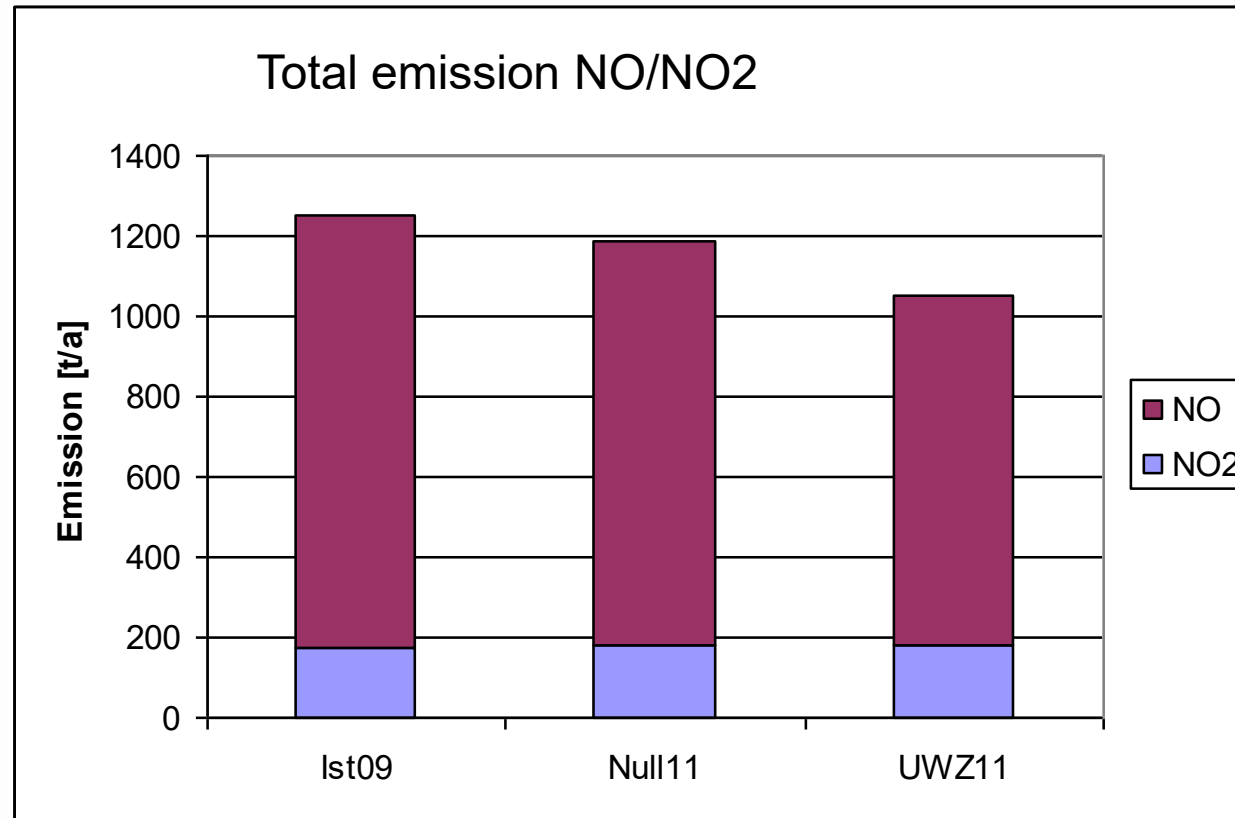


- Daily average amount of vehicle, HDV Share, urban busses
- Road slope
- Traffic situation
- Fleet Composition (Euro norms, separately for urban busses) in reference year 2009 und 2011 based on the Federal Car Register of the Kraftfahrtbundesamtes (KBA)

Pollution Groups in compliance to the German sticker directive for lower emission zones.

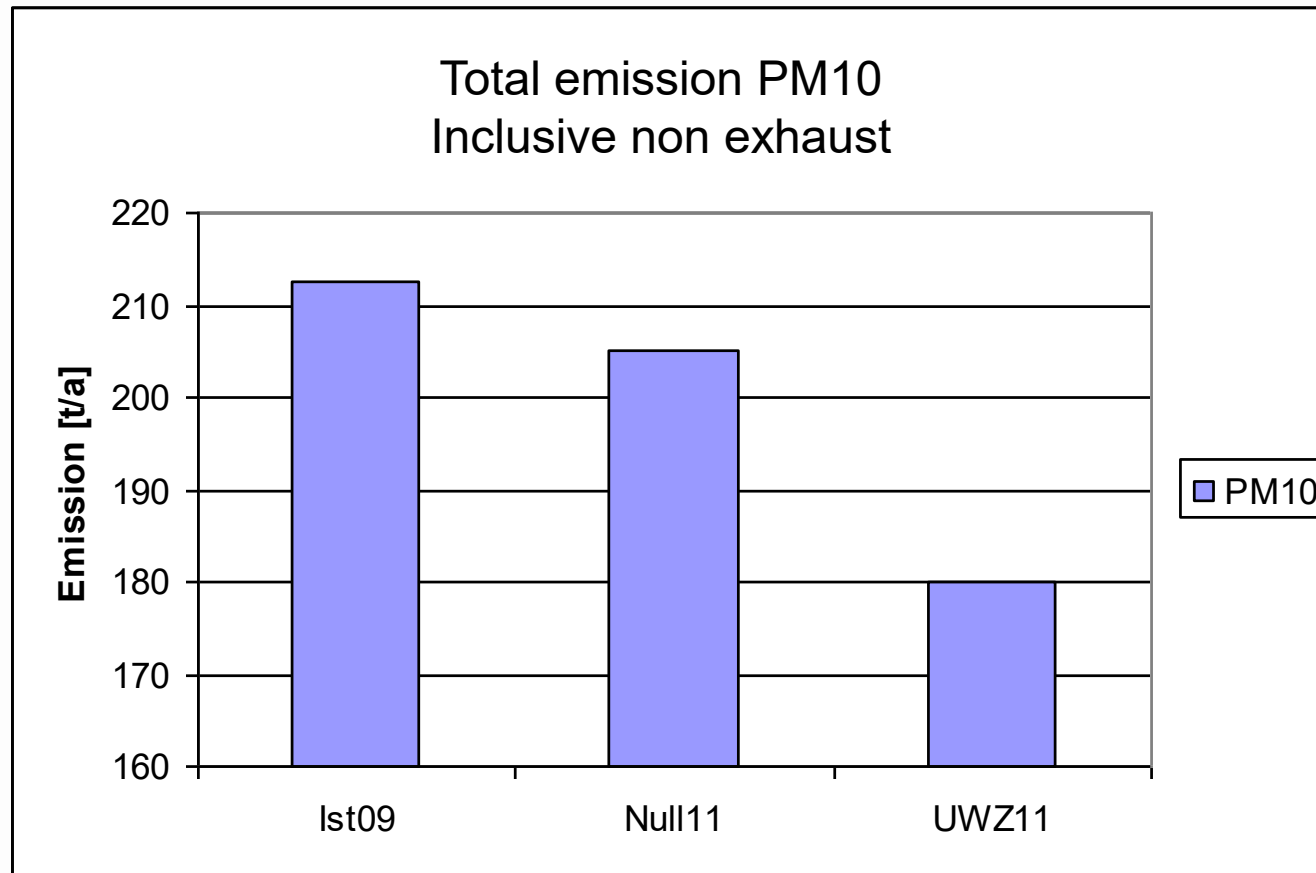
KennzeichnungsVO, Beschluss des Bundesrates vom 7.4.2006		SG 1 ³⁾ ohne Plakette	SG 2 ³⁾ rot mit Ziffer 2	SG 3 ³⁾ gelb mit Ziffer 3	SG 4 ³⁾ grün mit Ziffer 4
Pkw /INfz	sNfz				
Diesel Euro 1 und davor	Diesel Euro I und davor				
Diesel Euro 2 ¹⁾	Diesel Euro II ¹⁾				
Diesel Euro 3 ¹⁾	Diesel Euro III ¹⁾				
Diesel Euro 4	Diesel Euro IV, V, EEV ²⁾				
Otto vor Euro 1					mit US-Kat
Otto ab Euro 1, Elektro-, Brennstoffzellenfzg.					
¹⁾ Dieselfahrzeuge werden auf Antrag einer höheren Schadstoffgruppe zugeordnet, wenn sie durch die Ausrüstung mit einer Technik zur Reduzierung der Partikelemissionen den Partikelgrenzwert dieser Schadstoffgruppe erreichen.					
²⁾ EEV = Enhanced Environmentally Friendly Vehicle					
³⁾ Schadstoffgruppe					





- Reduction in comparison between zero case 2011 and scenario lower emission tone 2011: NOx 12 %
- Bus emission on some road segments up to 90%

Emissions in the lower emission zone PM10



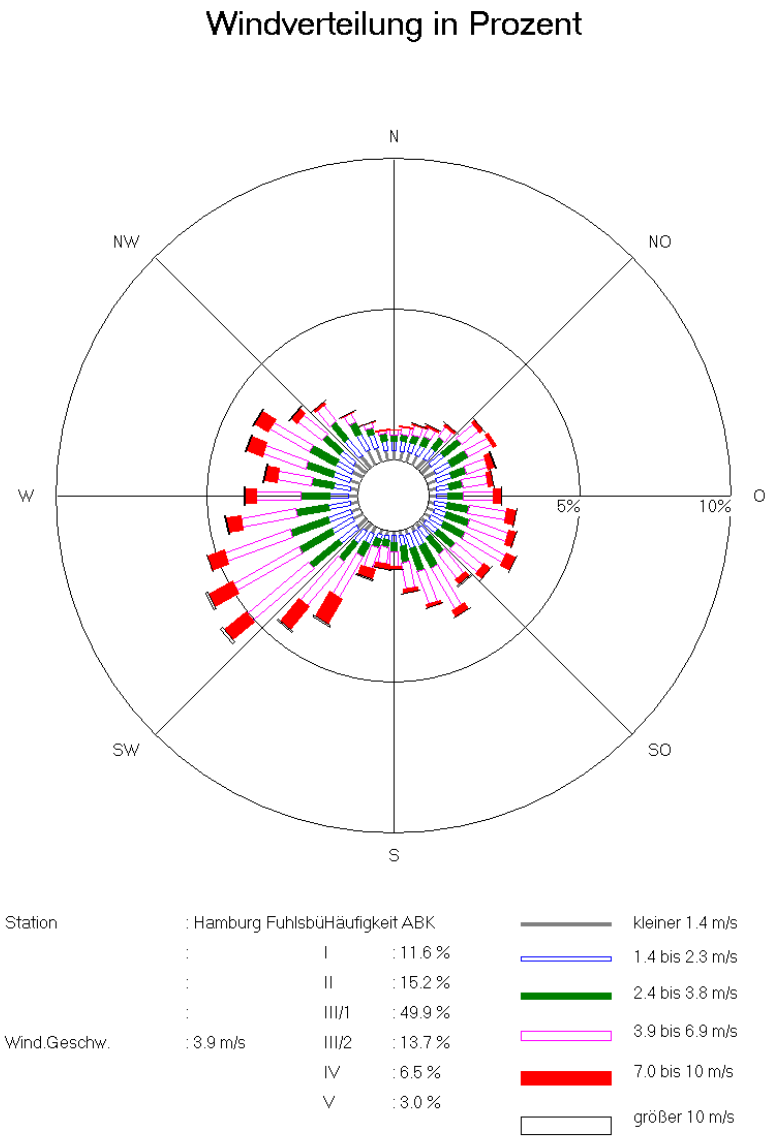
- Reduction in comparison between zero case 2011 and scenario lower emission tone 2011: NOx 12 %
- Bus emission on some road segments up to 80%

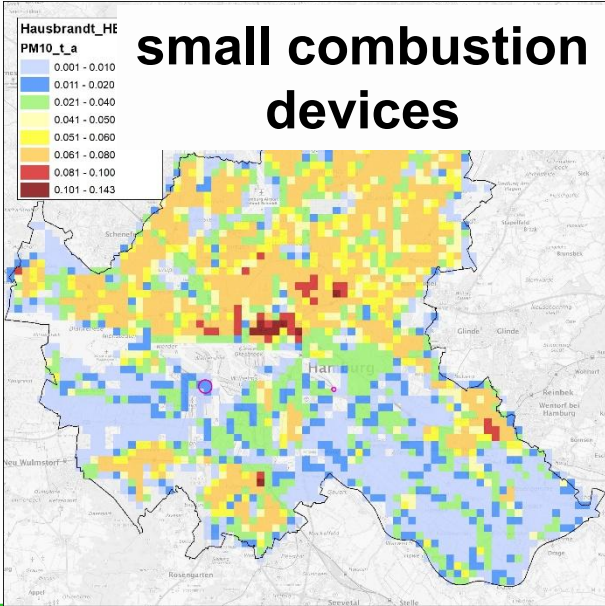
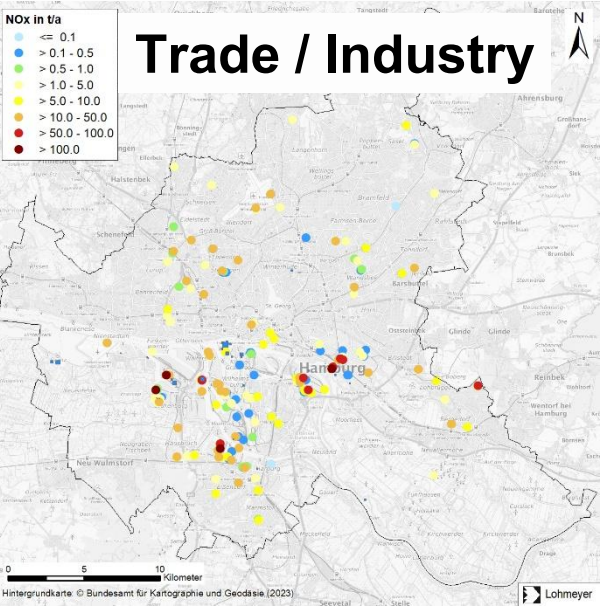
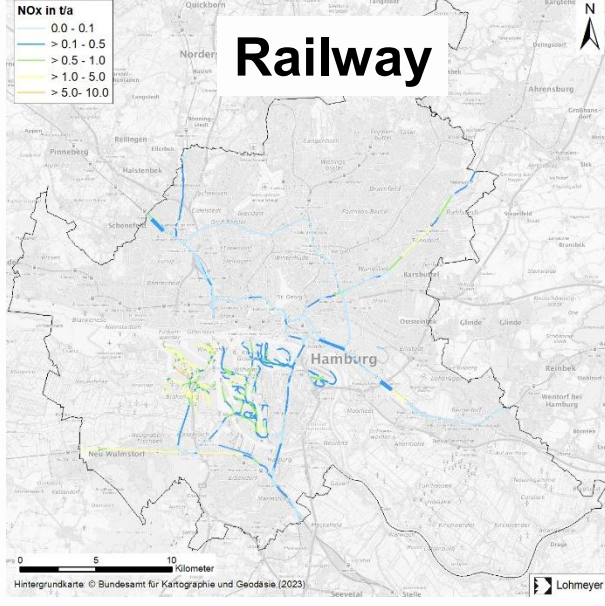
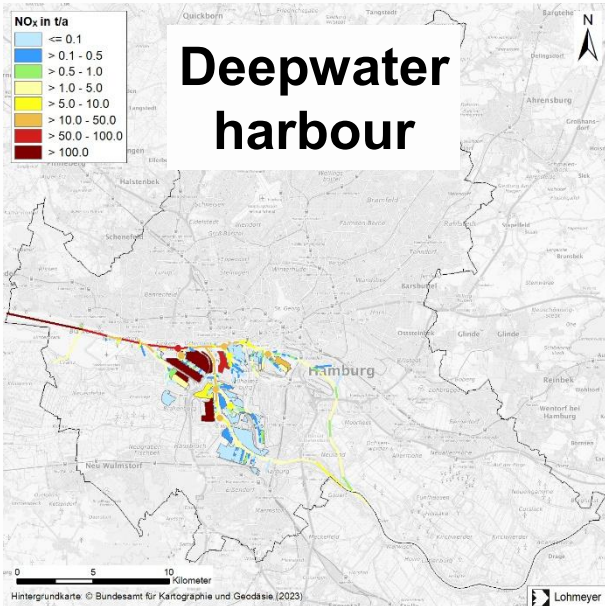
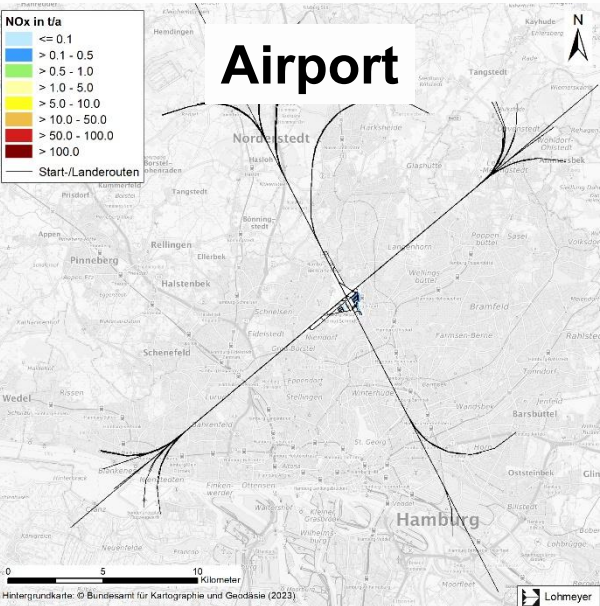
Max-Brauer-Allee

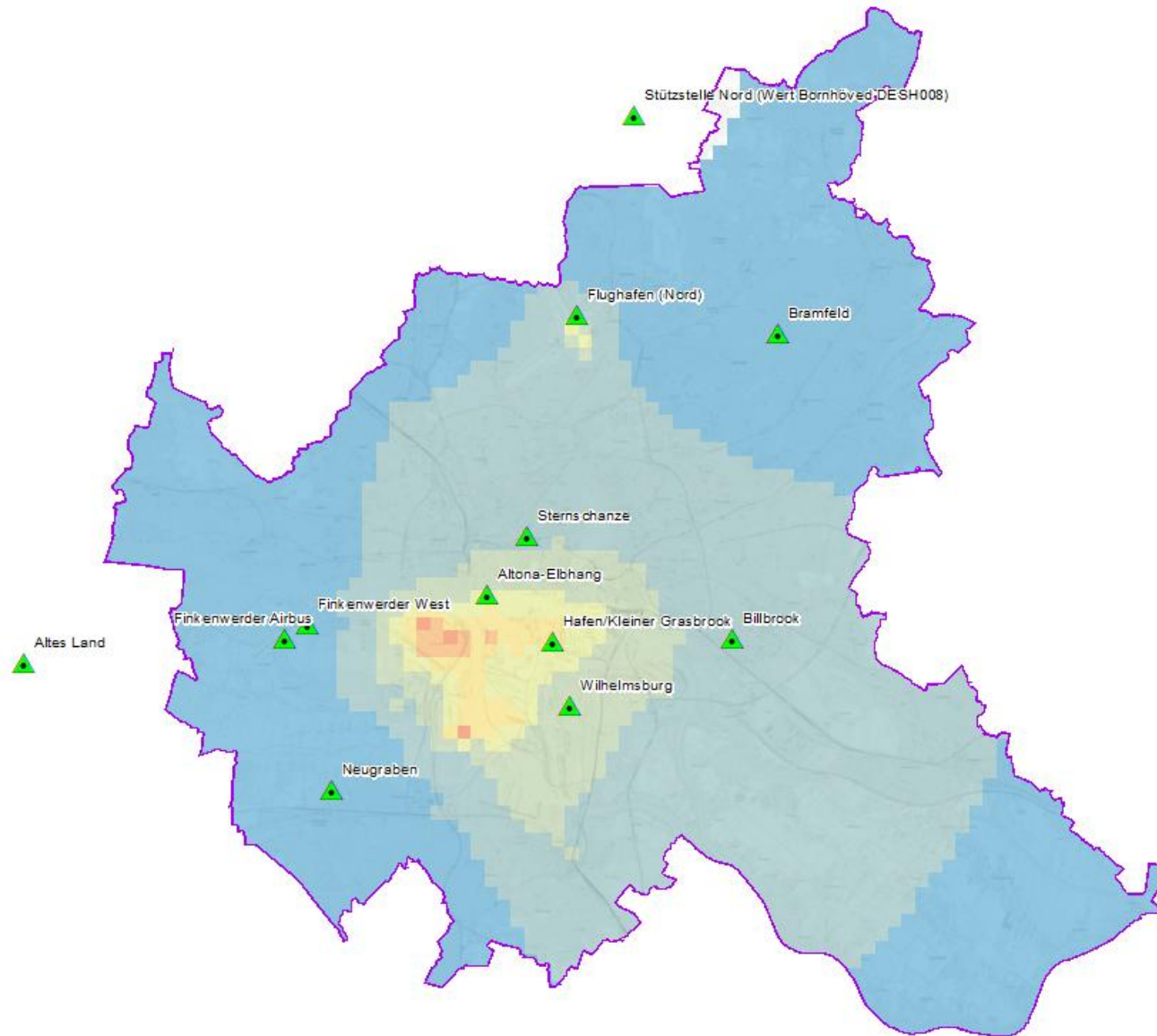


Wind speed
Wind direction
Dispersion class

Airport Hamburg Fuhlsbüttel
(DWD)

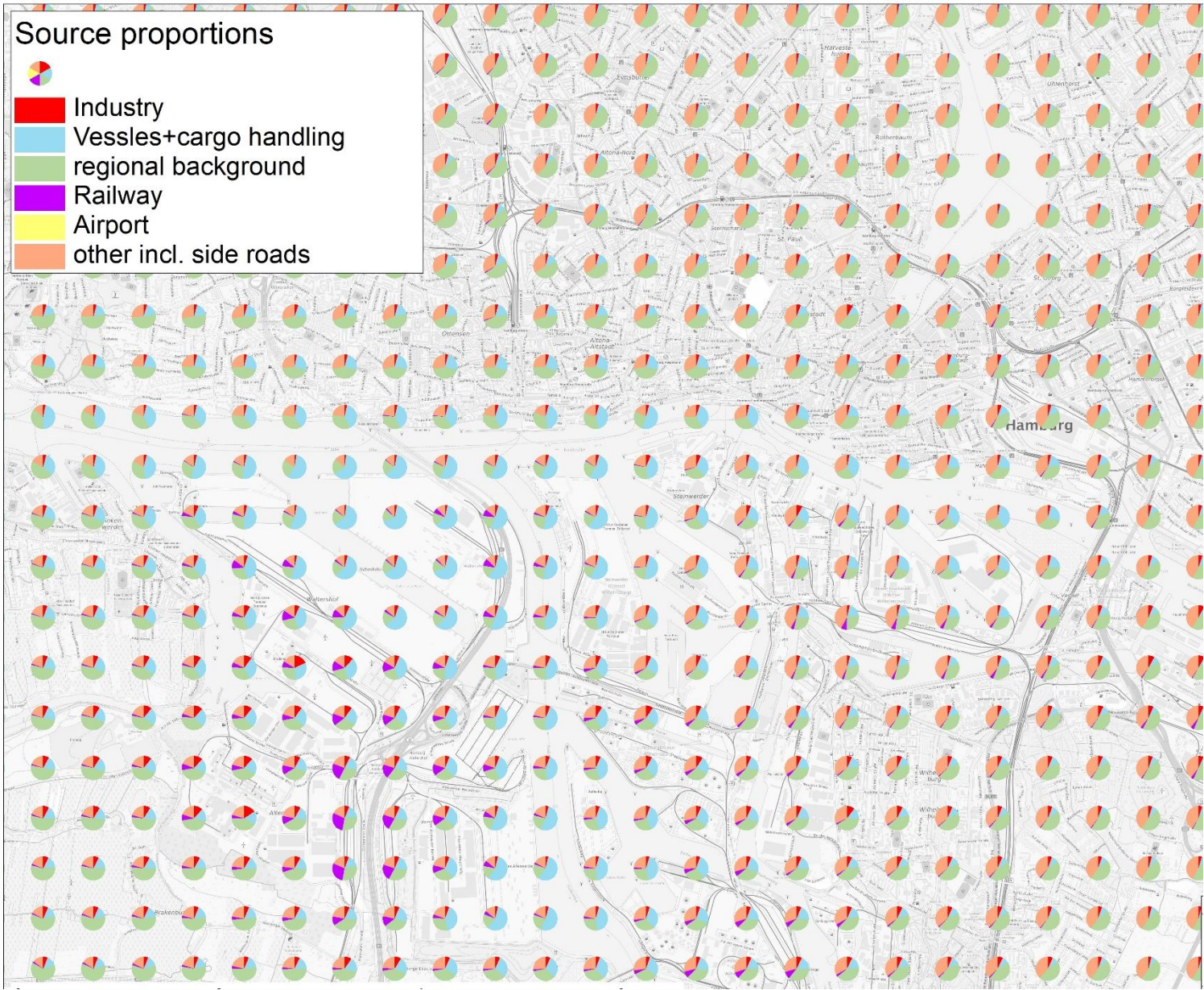


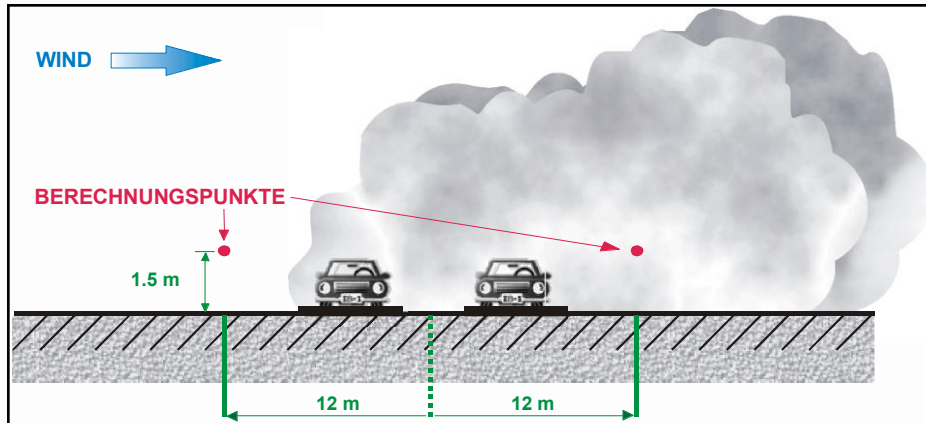




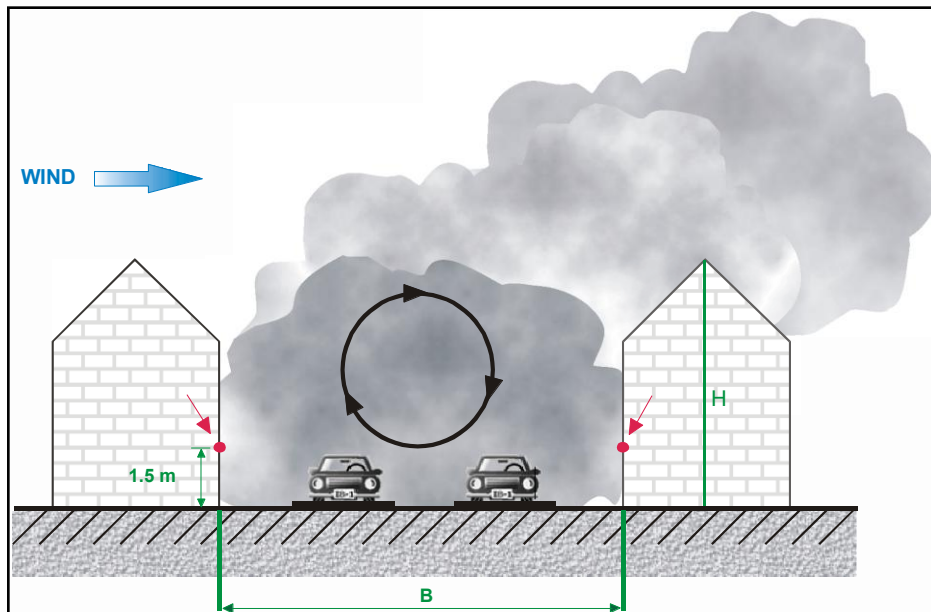
Background concentrations

- AUSTAL dispersion calculations
 - Industrial sources
 - Deep water harbour (ships, port railway, handling equipment)
 - Rail traffic
 - Shipping traffic
 - Airport
 - small combustion devices
- IMMIKART system for calibrating background concentrations to measured values of monitoring stations, including interpolation considering

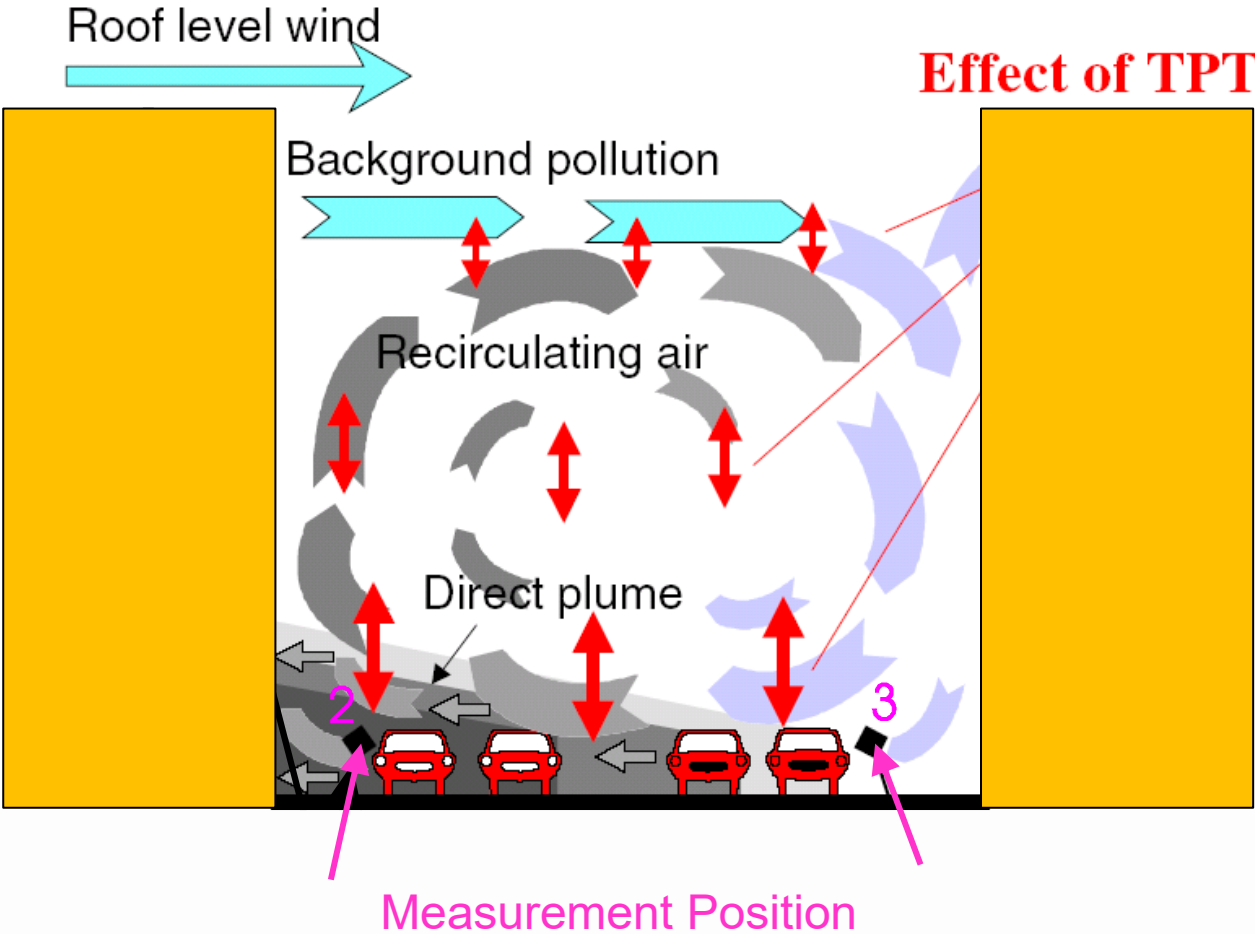


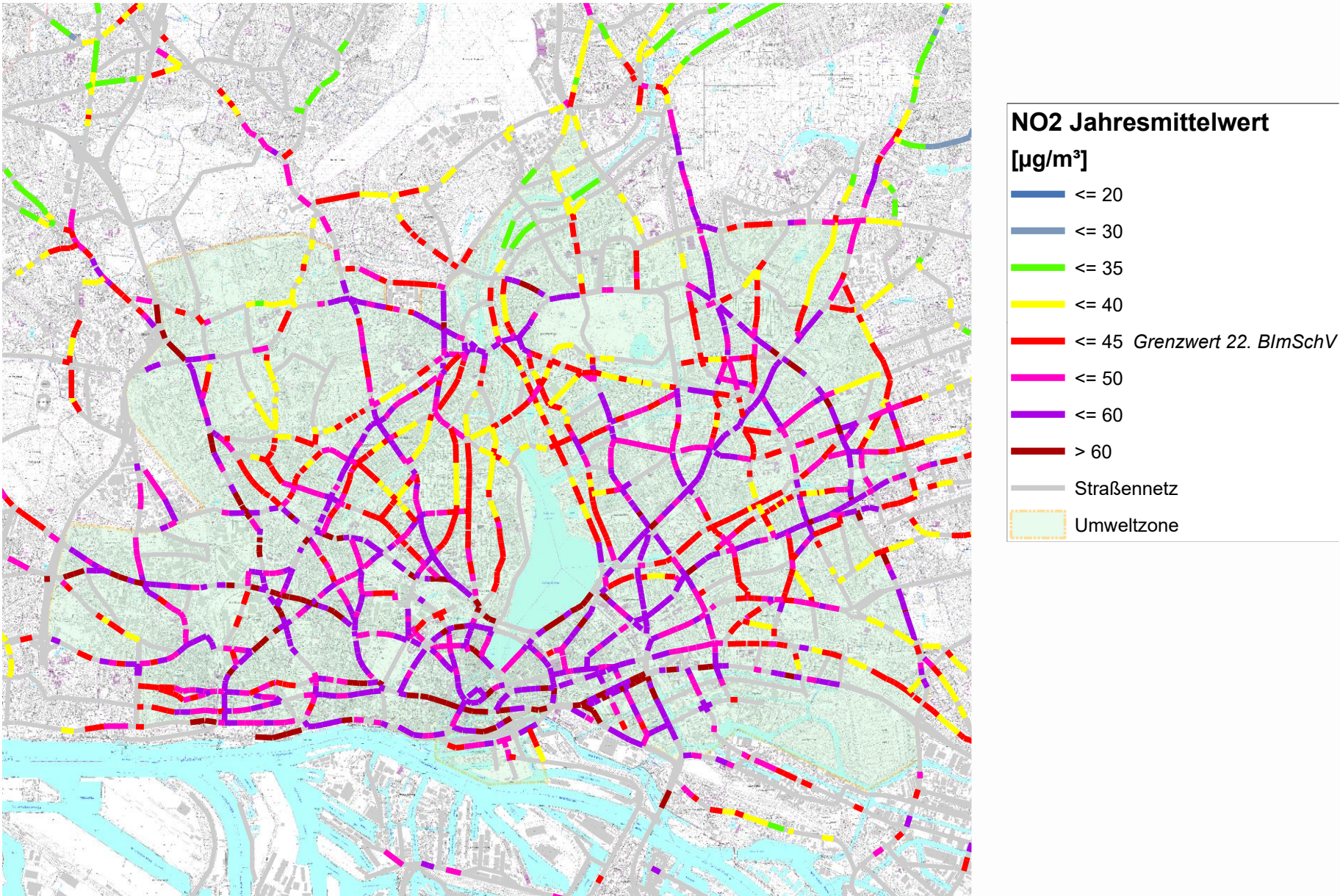


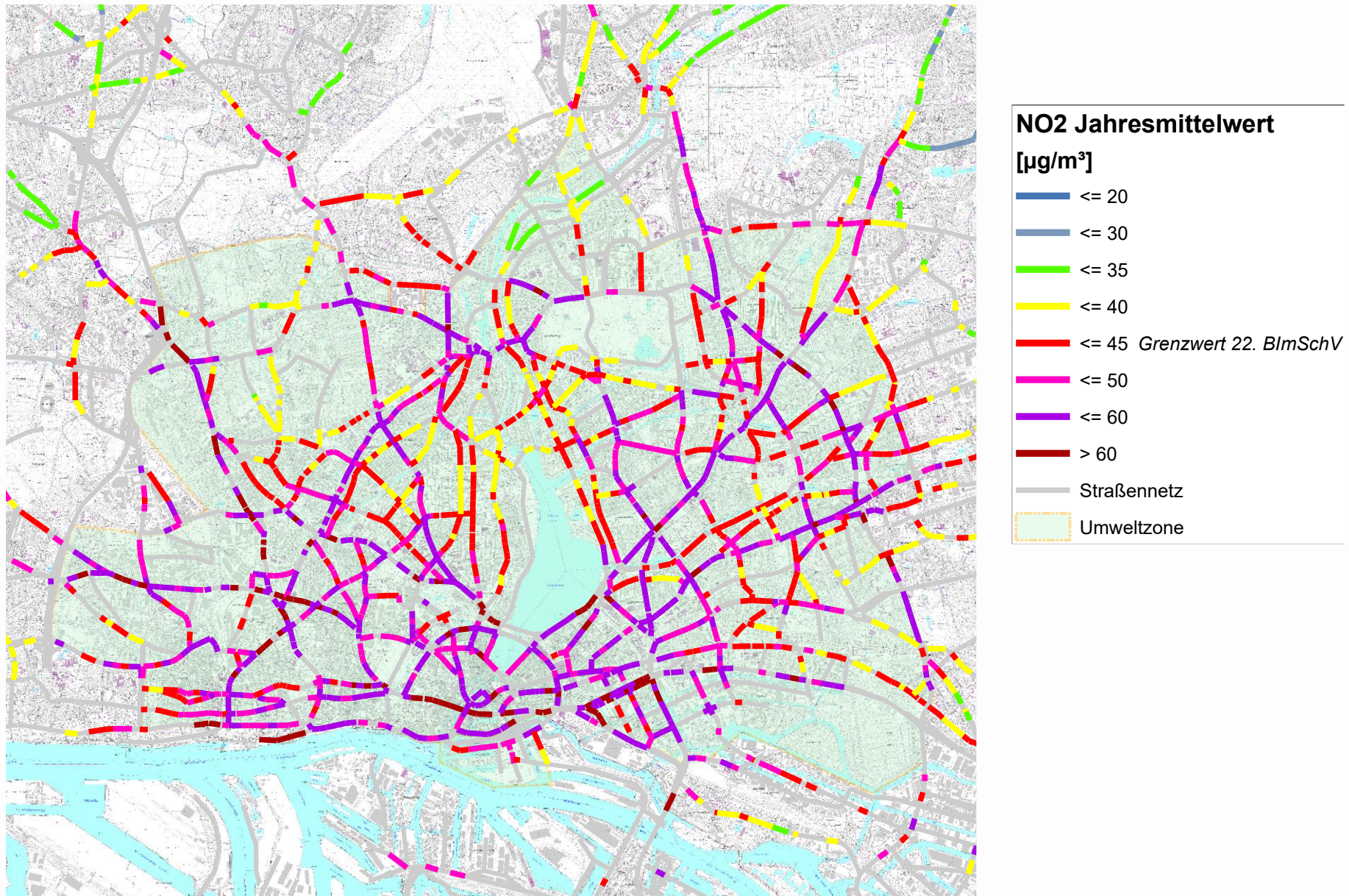
Pollution plume without buildings
→ good removal

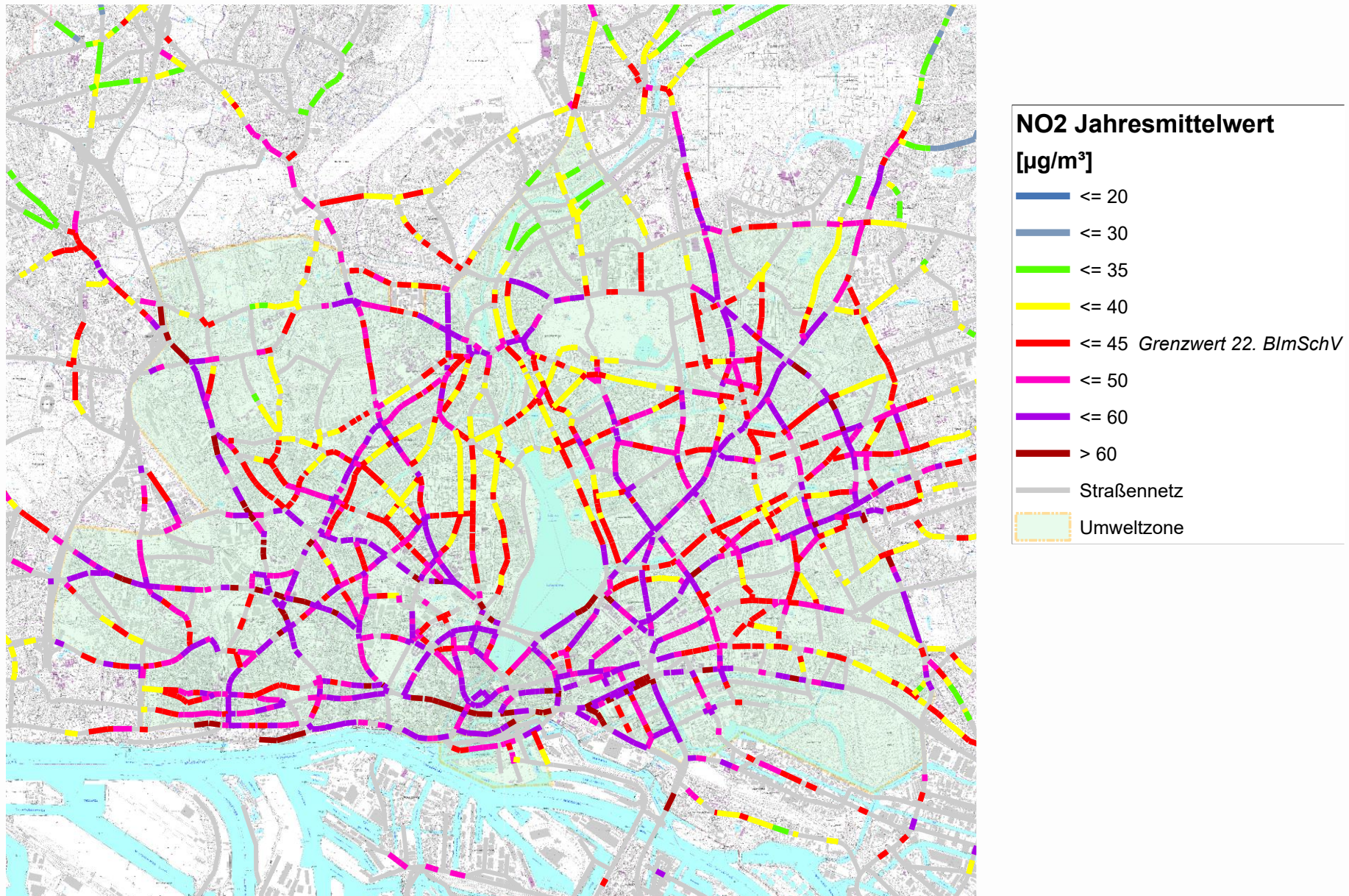


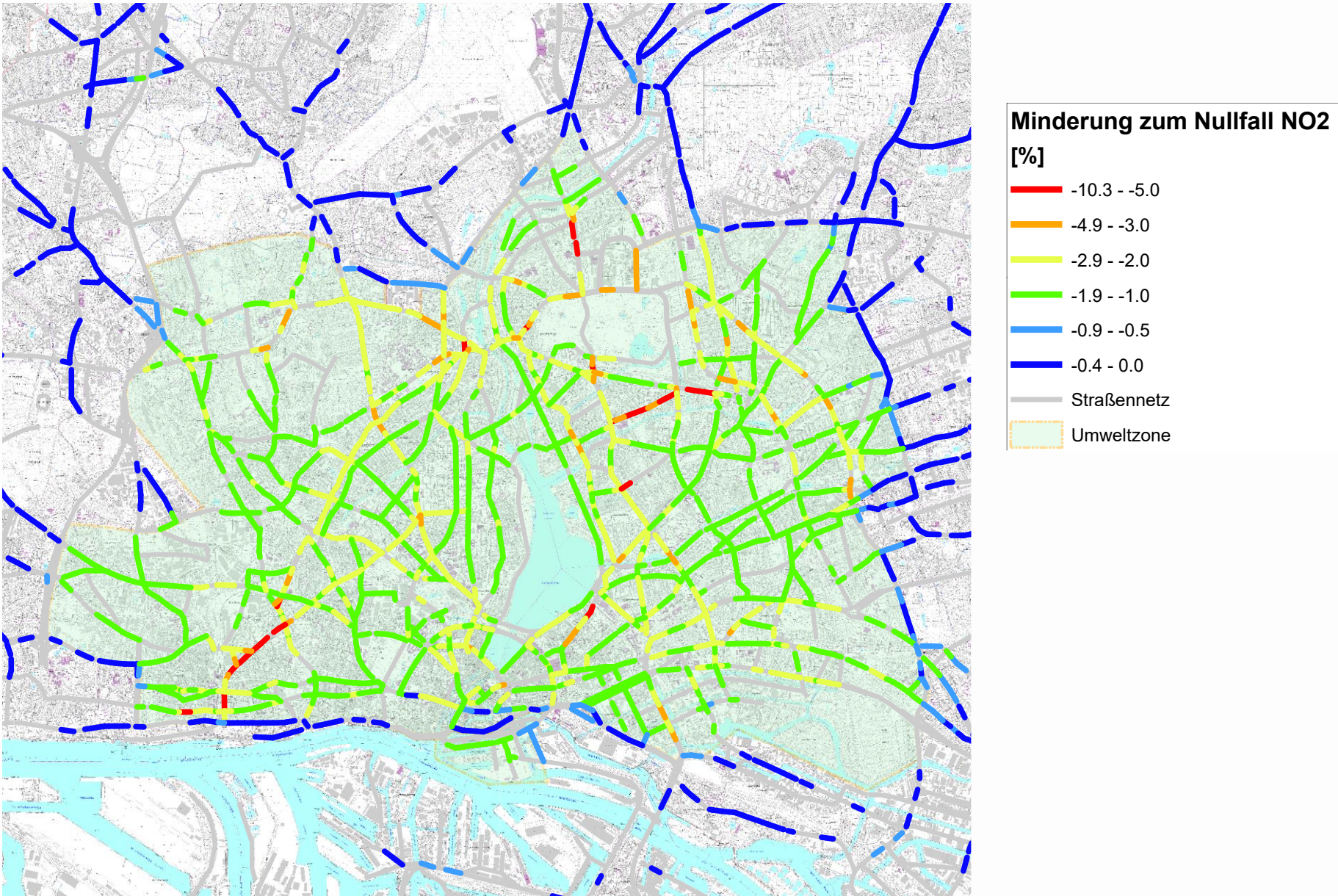
Pollution plume in a street canyon
→ bad removal
The polluted air is rotating in a vortex in the street canyon and flows off slowly.



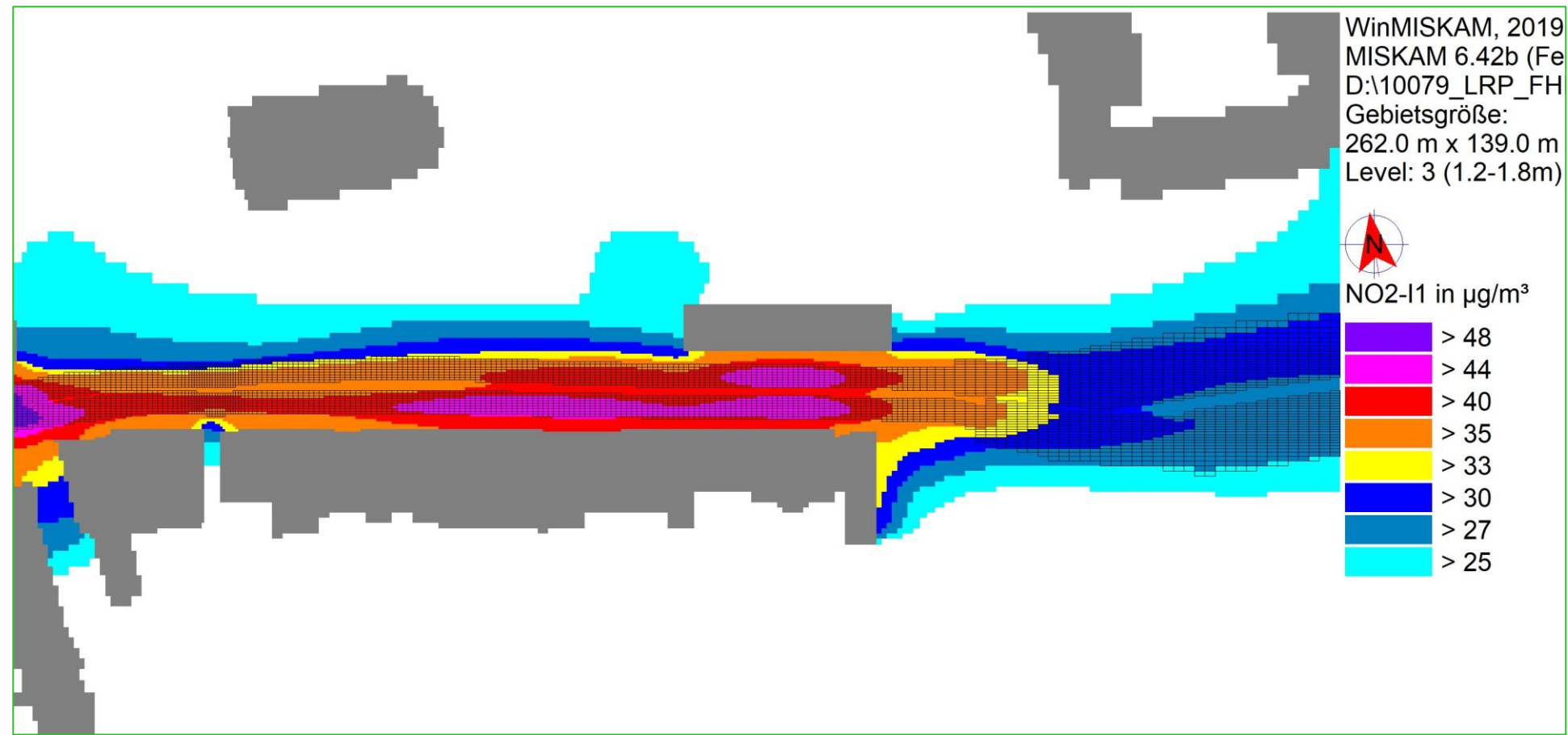












A hotspot was identified using the PROKAS screening model. Area-wide concentrations were calculated at a hotspot using the detailed MISKAM model. Miskam can take building airflow into account. It uses a 3D building model.

[WinMISKAM](https://www.lohmeyer.de/en/software-sales-distribution/product-overview/winmiskam/)

<https://www.lohmeyer.de/en/software-sales-distribution/product-overview/winmiskam/>

Thank you for your attention



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