

ARE PARENTS DRIVING AIR POLLUTION AROUND SCHOOLS?

CZY RODZICE DOWOŻĄCY DZIECI NA LEKCJE POWODUJĄ
ZANIECZYSZCZENIE POWIETRZA WOKÓŁ SZKÓŁ?

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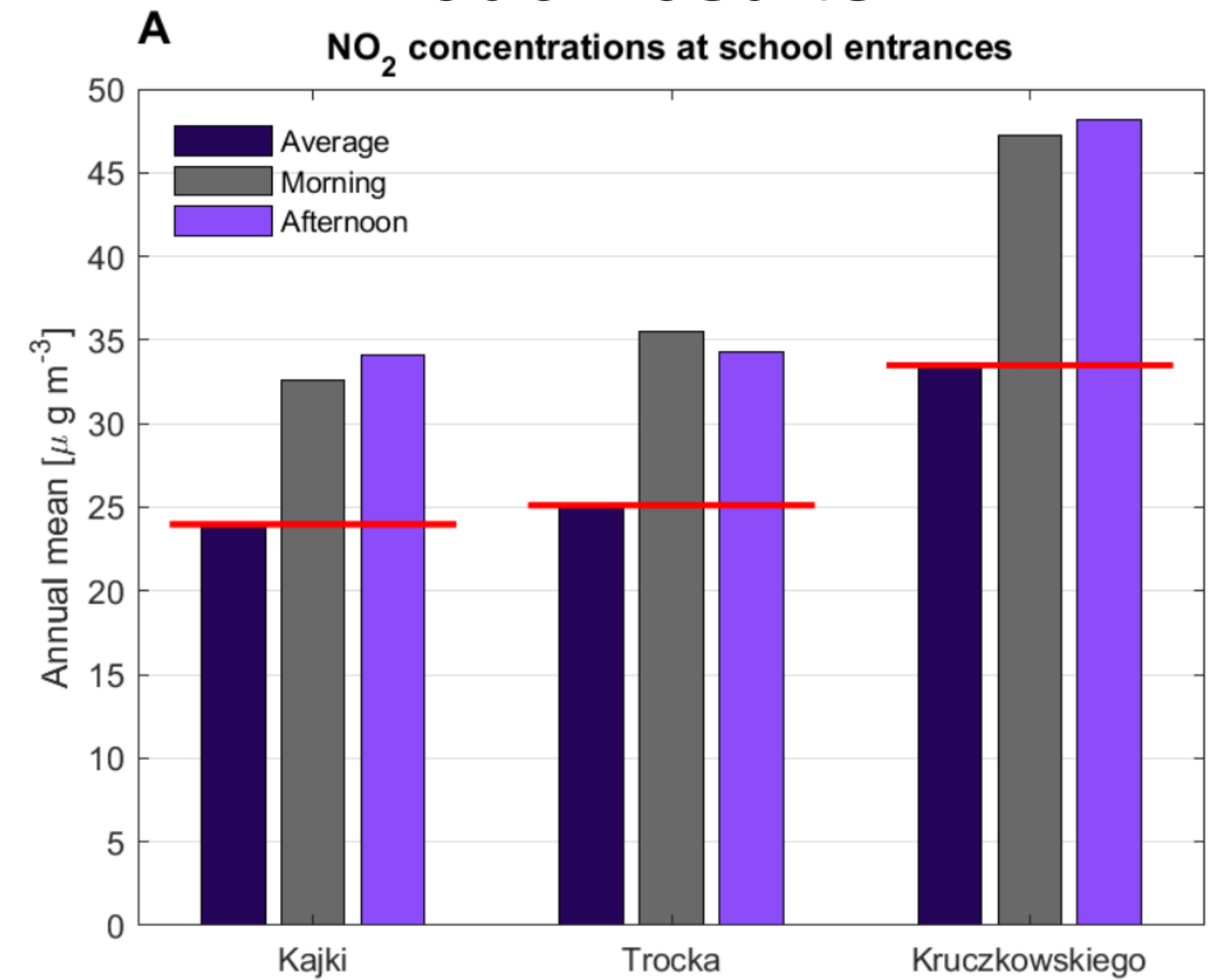


Background

Children's exposure to pollution



Model results



Outlook

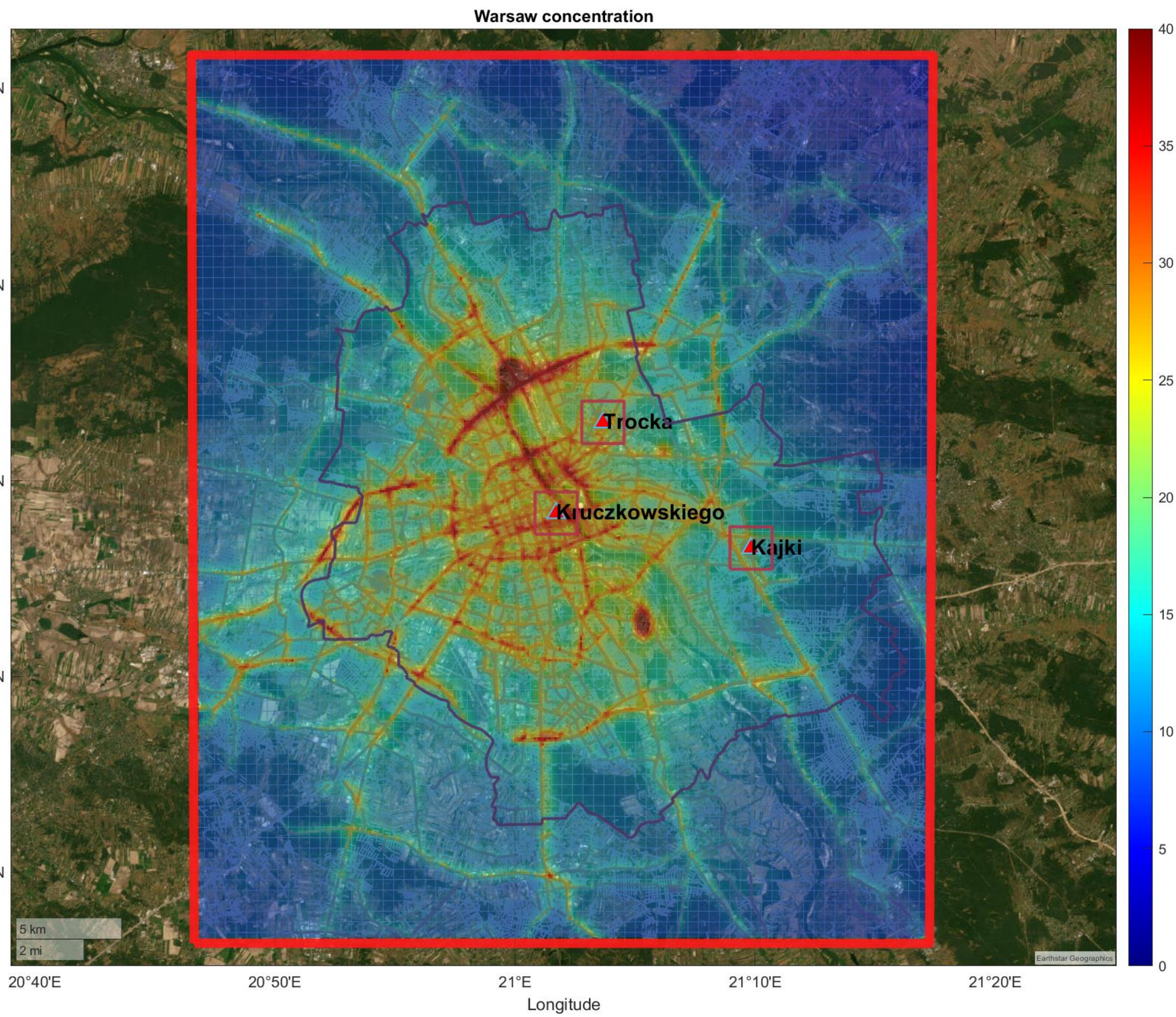
[EN]

1. AQ maps for Warsaw municipality
2. Monitoring insight
3. Estimates of the parents contribution to emissions around schools
4. Results of intervention scenarios
5. Conclusions

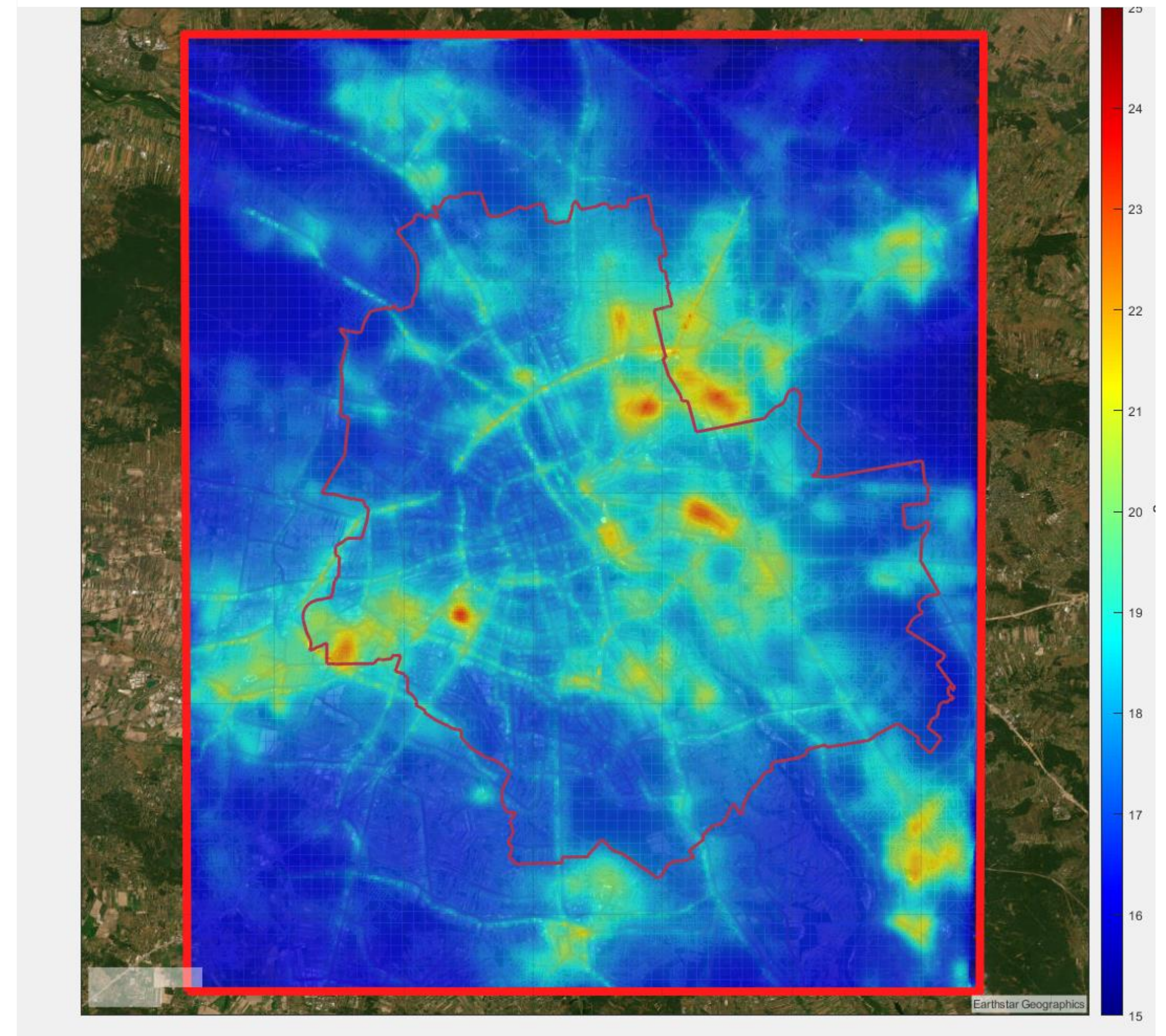
[PL]

1. Mapy AQ dla gminy Warszawa
2. Analiza monitoringu
3. Szacunkowy wkład rodziców w emisje wokół szkół
4. Wyniki scenariuszy interwencji
5. Wnioski

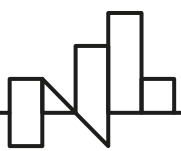
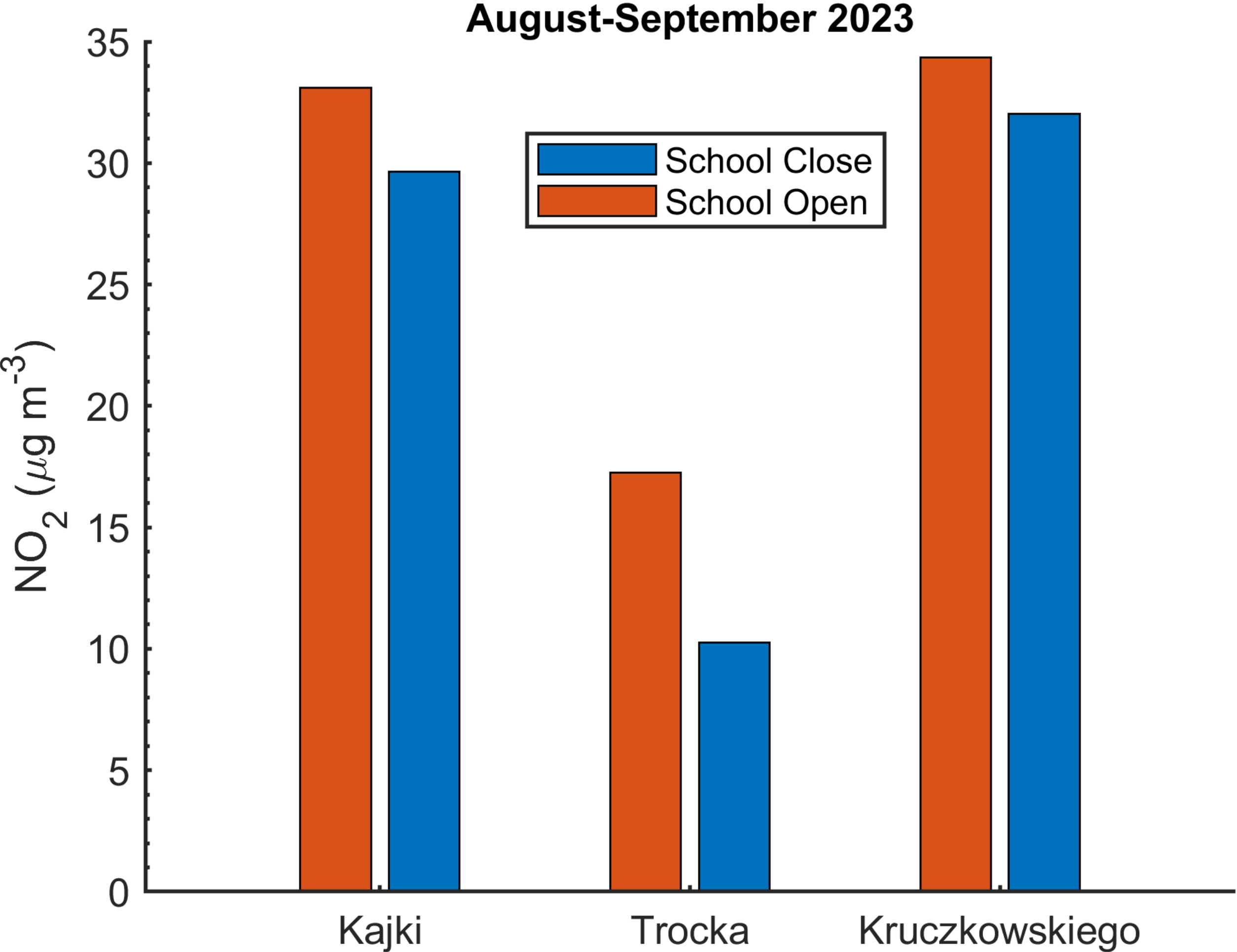
Modelled NO₂ annual mean (ug/m³)



Modelled PM_{2.5} annual mean (ug/m³)



Monitoring



Three pilot schools in Warsaw

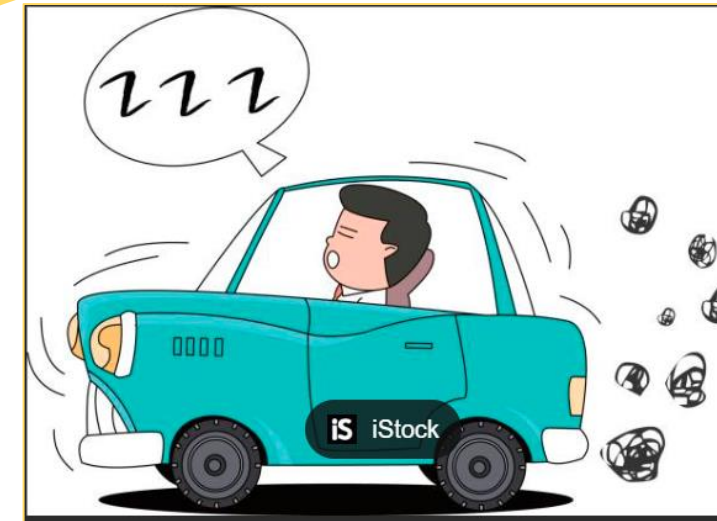


21% (11- 33%) of children are driven to school.

10% of traffic is school related

But impacts other traffic emissions

Congestion



37% idling / morning drop-off

20% idling / afternoon pick-up

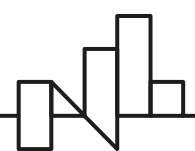
Idling

Cruising for parking

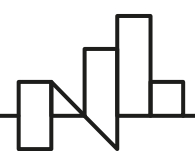
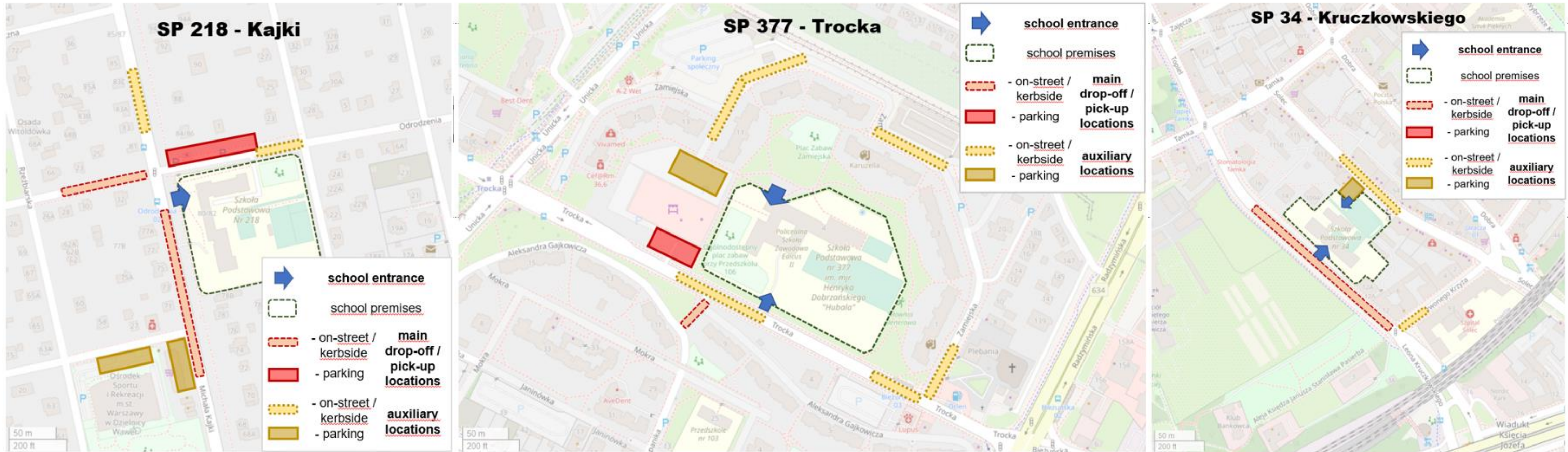
Cold start



1,2km of driving

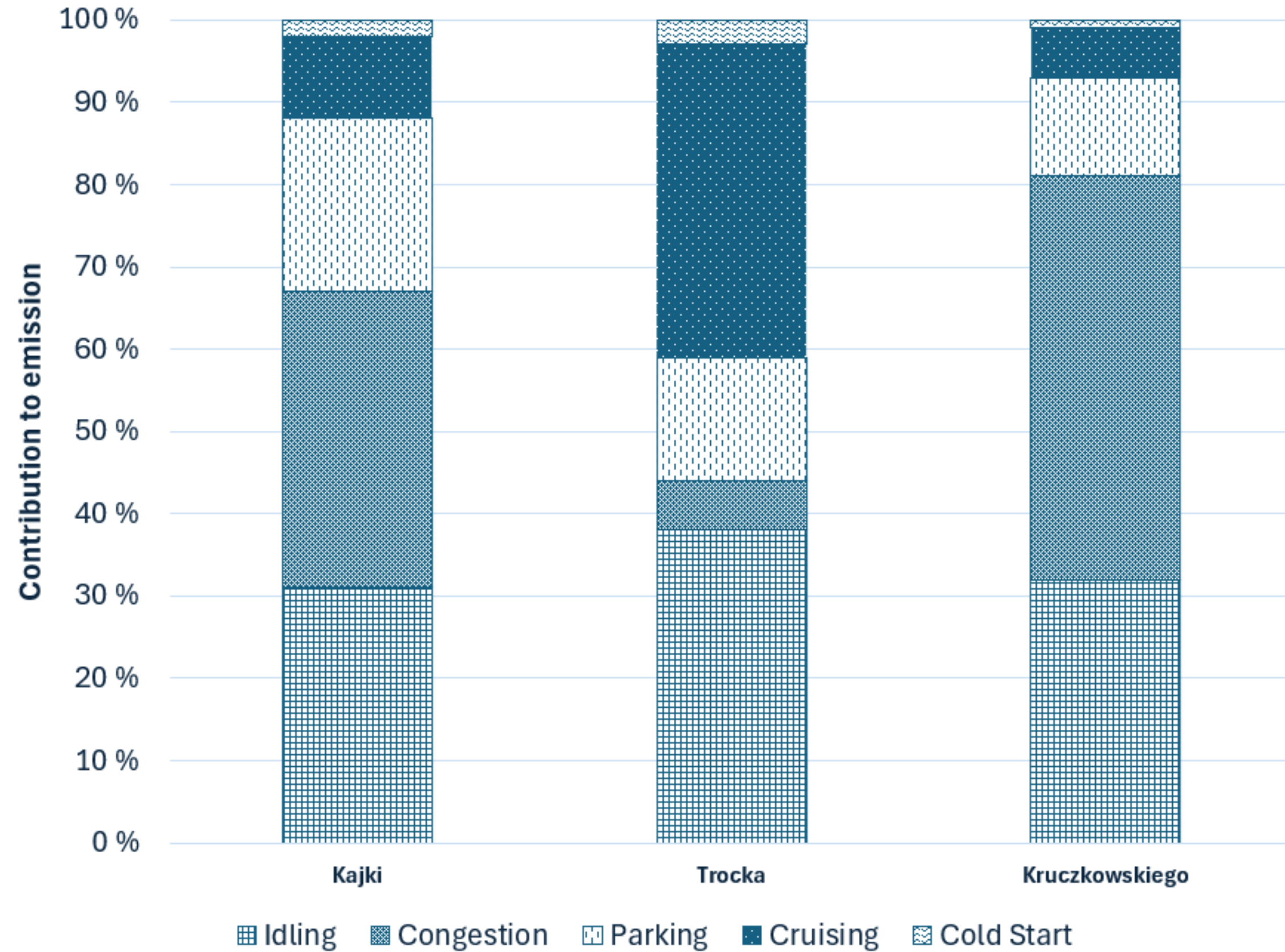


pick-up/drop-off areas designs

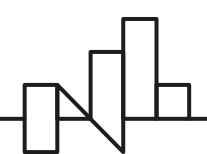
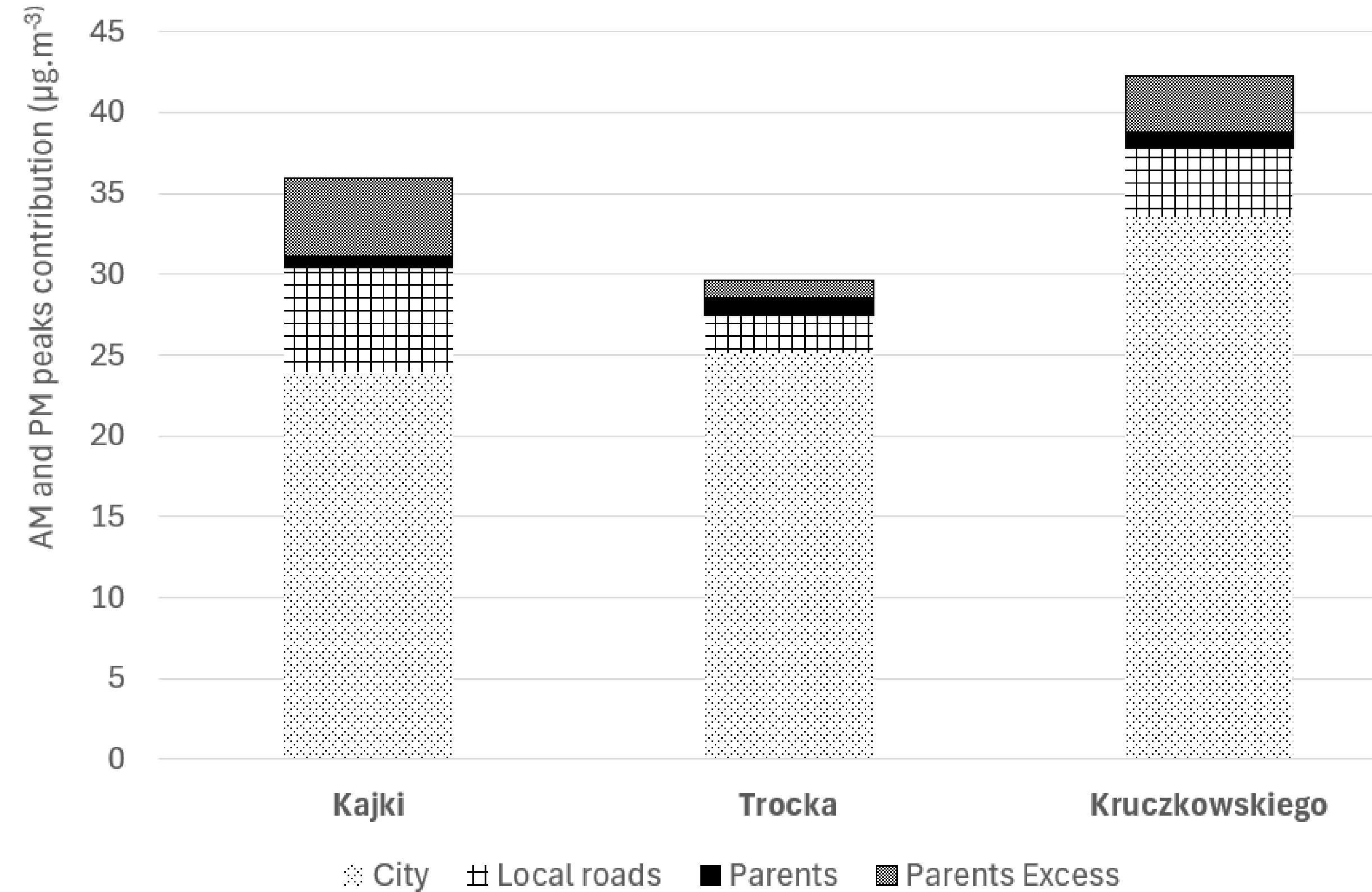


Results from excess_parents model

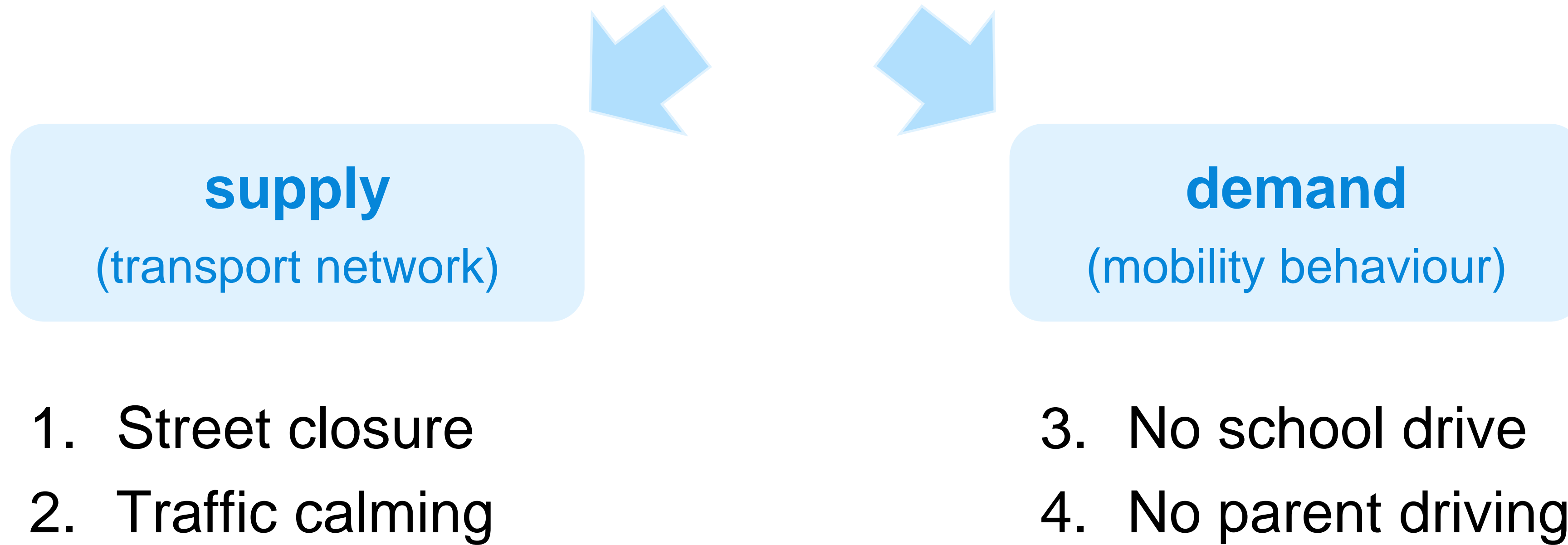
Excess_Parents: by Activity



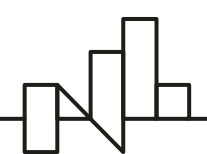
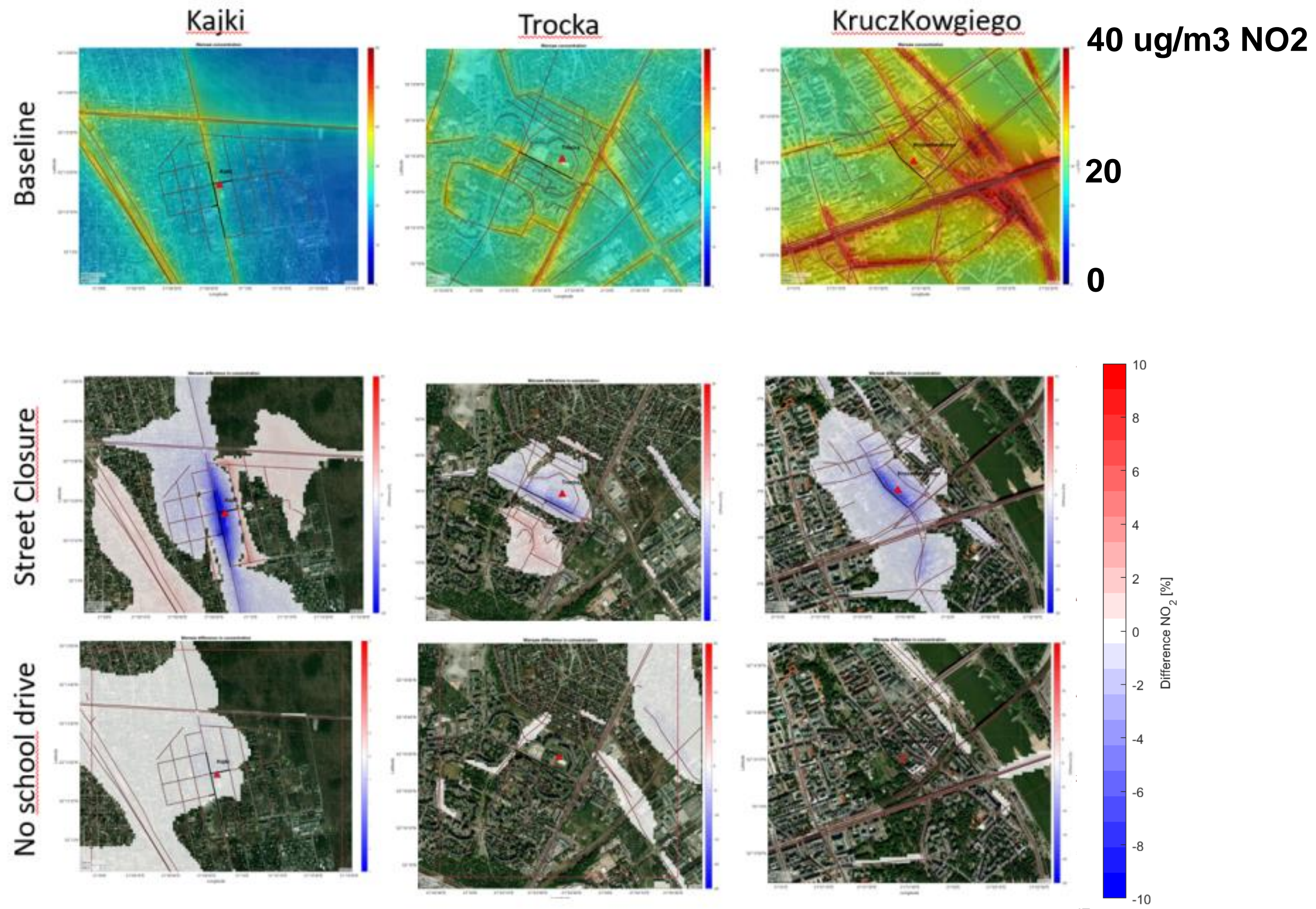
Source Contribution to Concentration at School



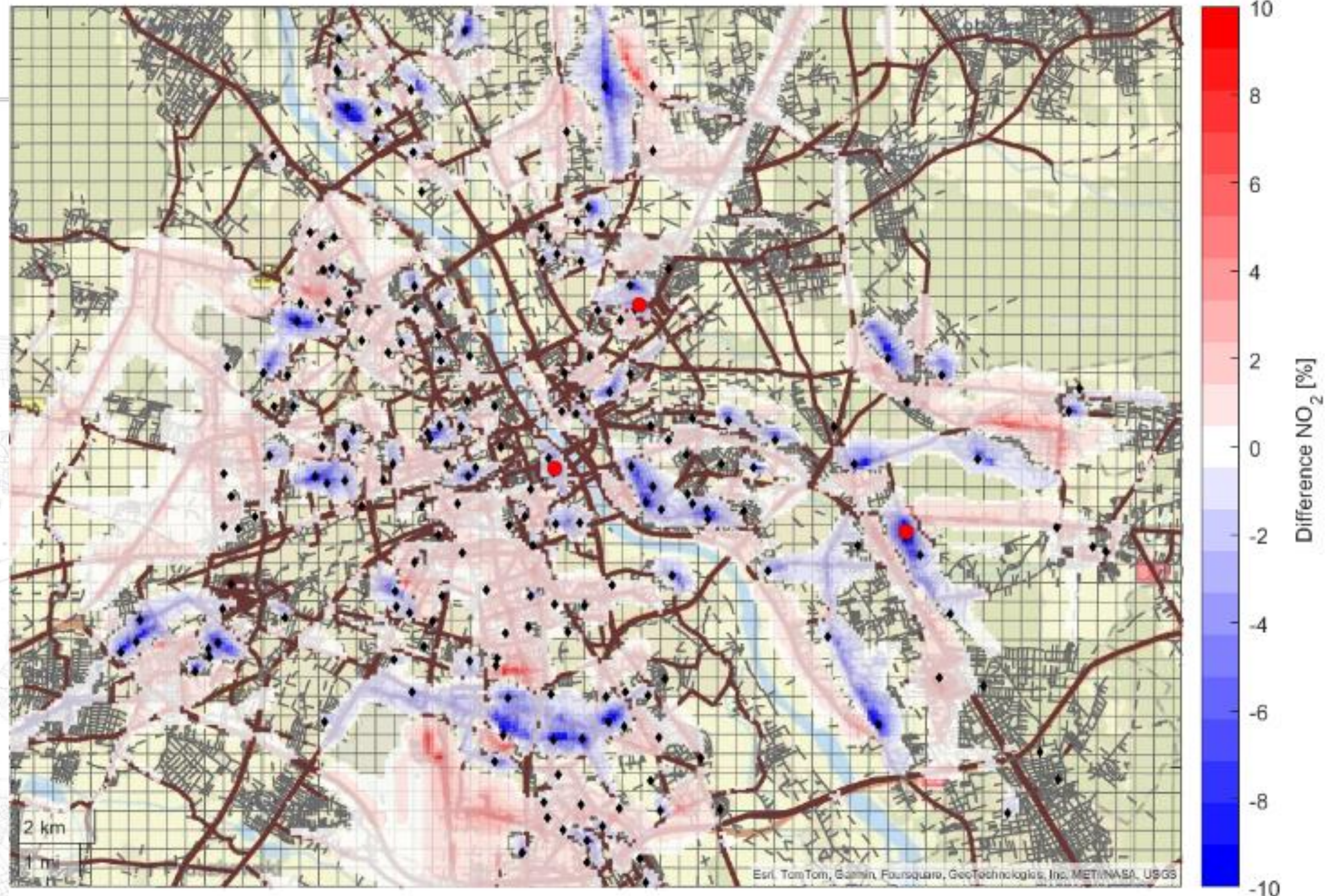
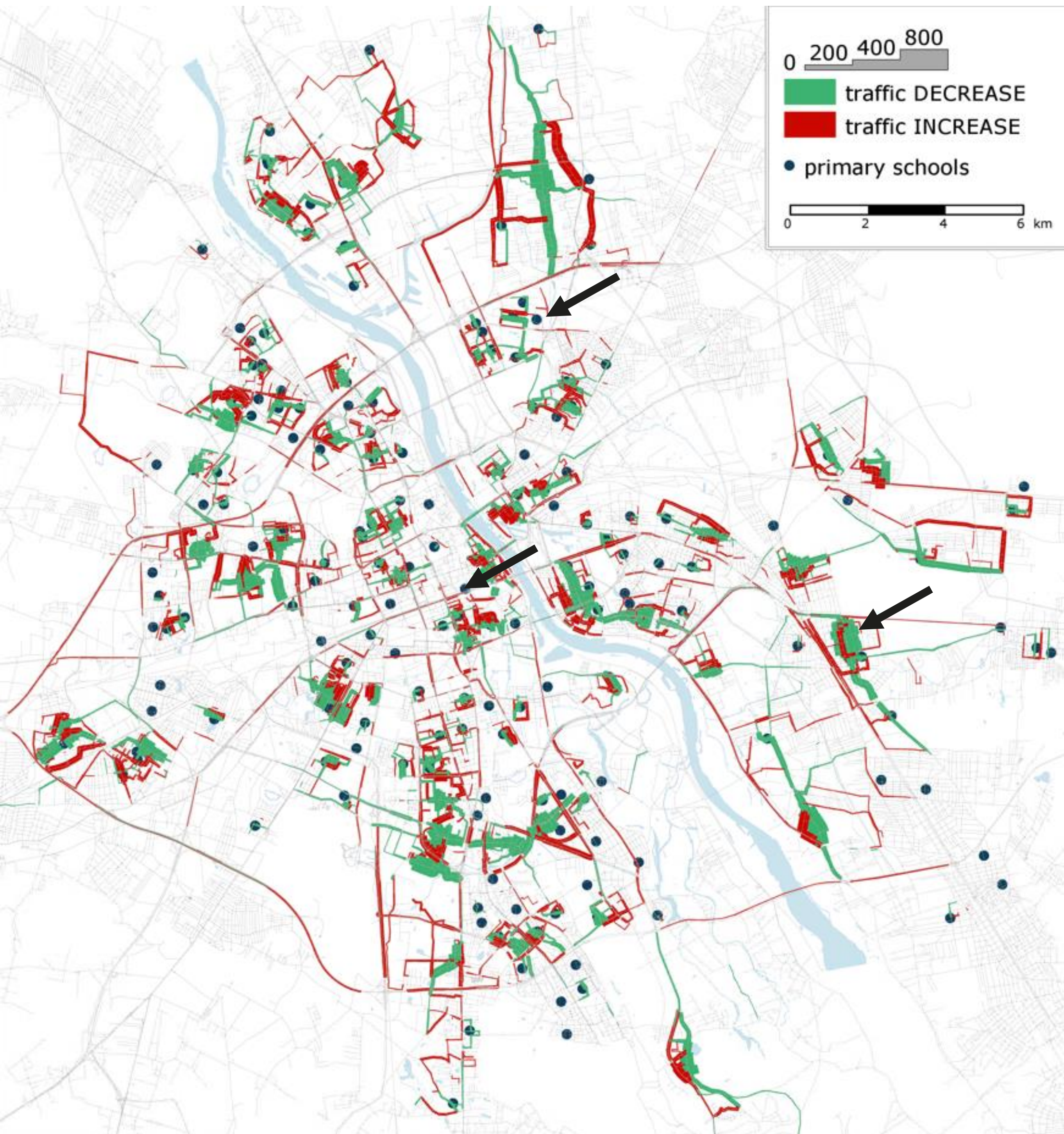
Scenarios



Warsaw scenarios: supply versus demand

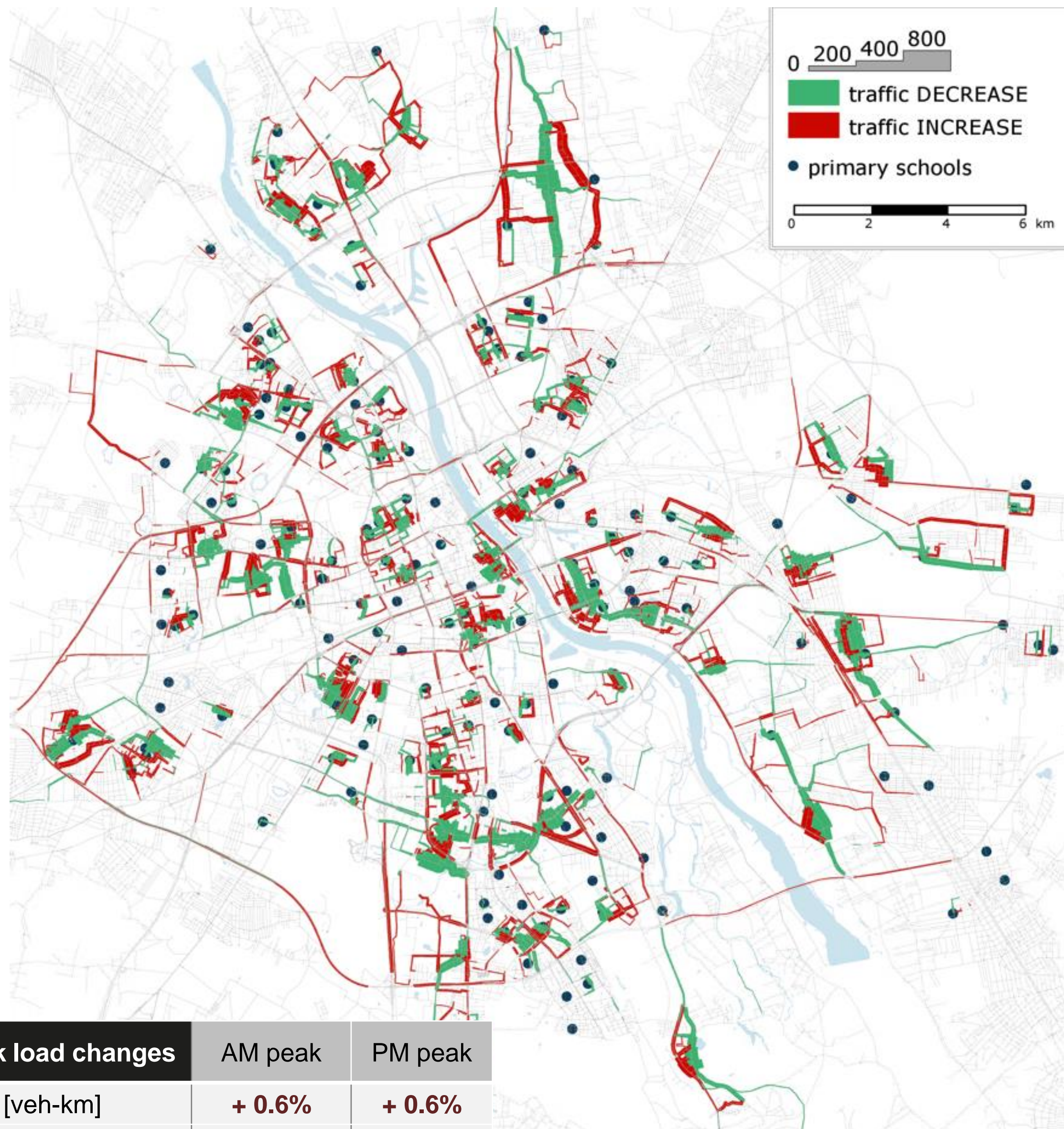


Warsaw scenarios: supply (STREET CLOSURE)



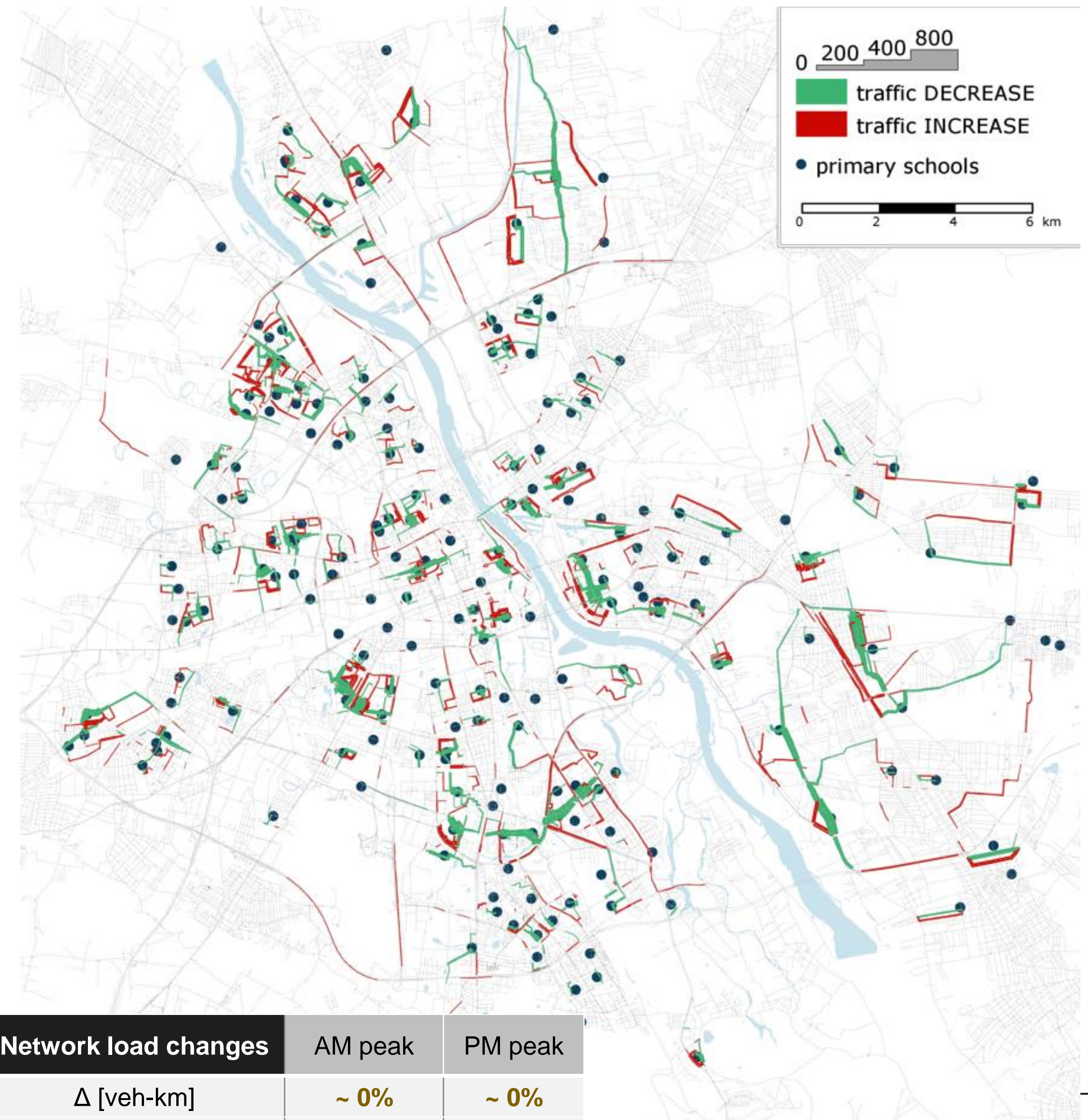
Warsaw scenarios: supply

Scenario: Street closure



Network load changes	AM peak	PM peak
Δ [veh-km]	+ 0.6%	+ 0.6%
Δ [veh-hrs]	+ 1.4%	+ 1.3%

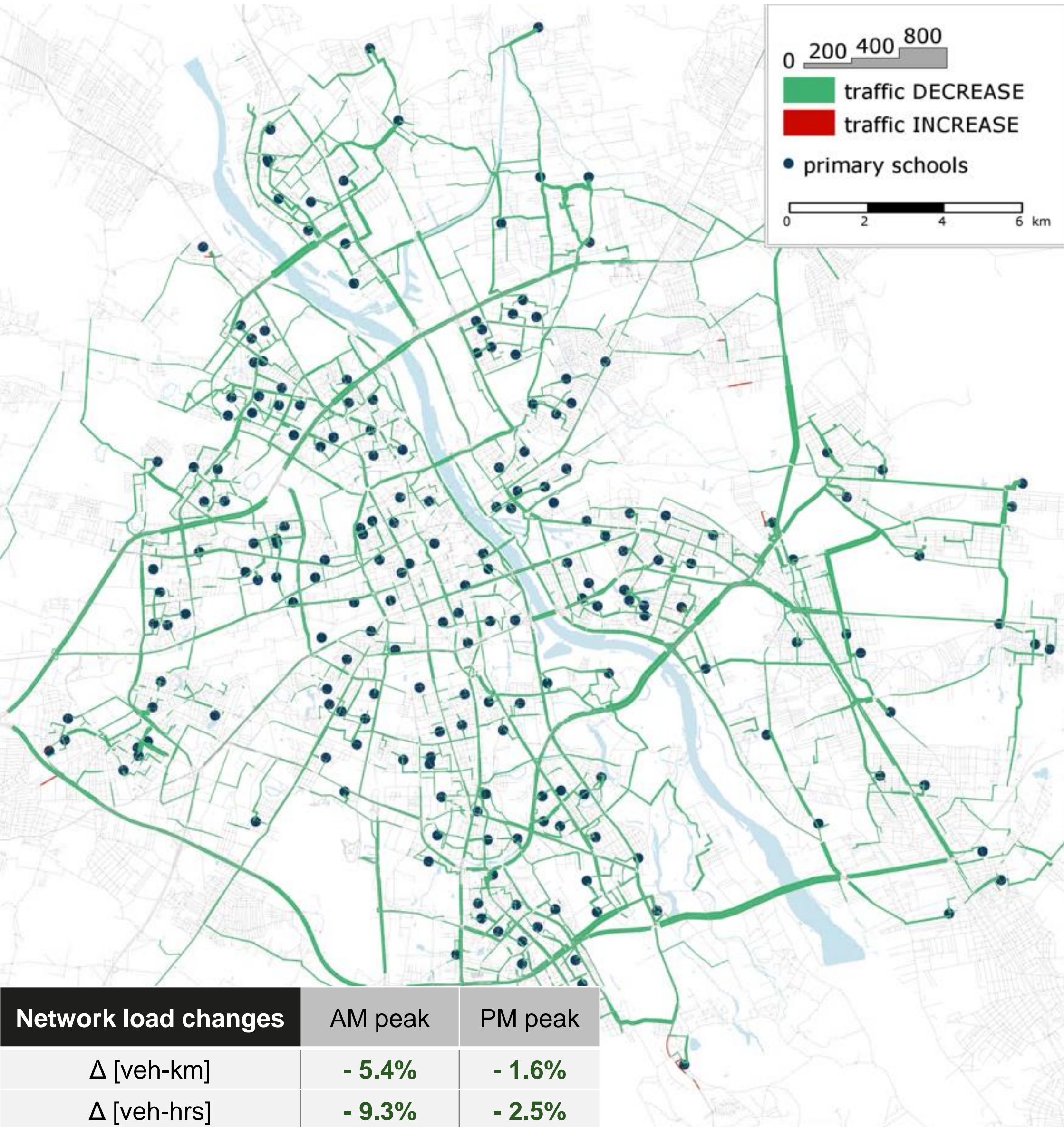
Scenario: Traffic calming



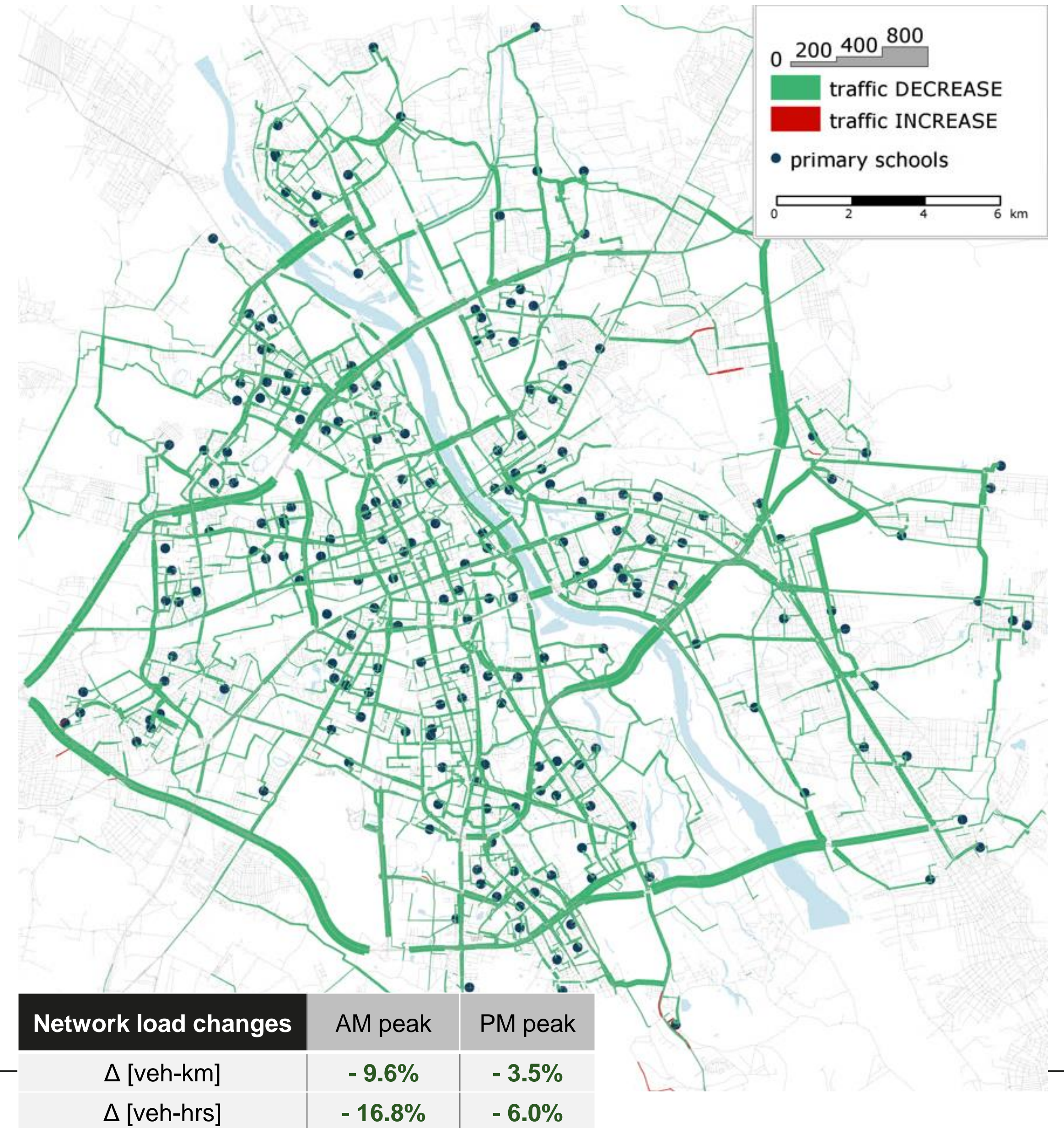
Network load changes	AM peak	PM peak
Δ [veh-km]	~ 0%	~ 0%
Δ [veh-hrs]	+ 1.5%	+ 1.3%

Warsaw scenarios: demand

Scenario: No school drive

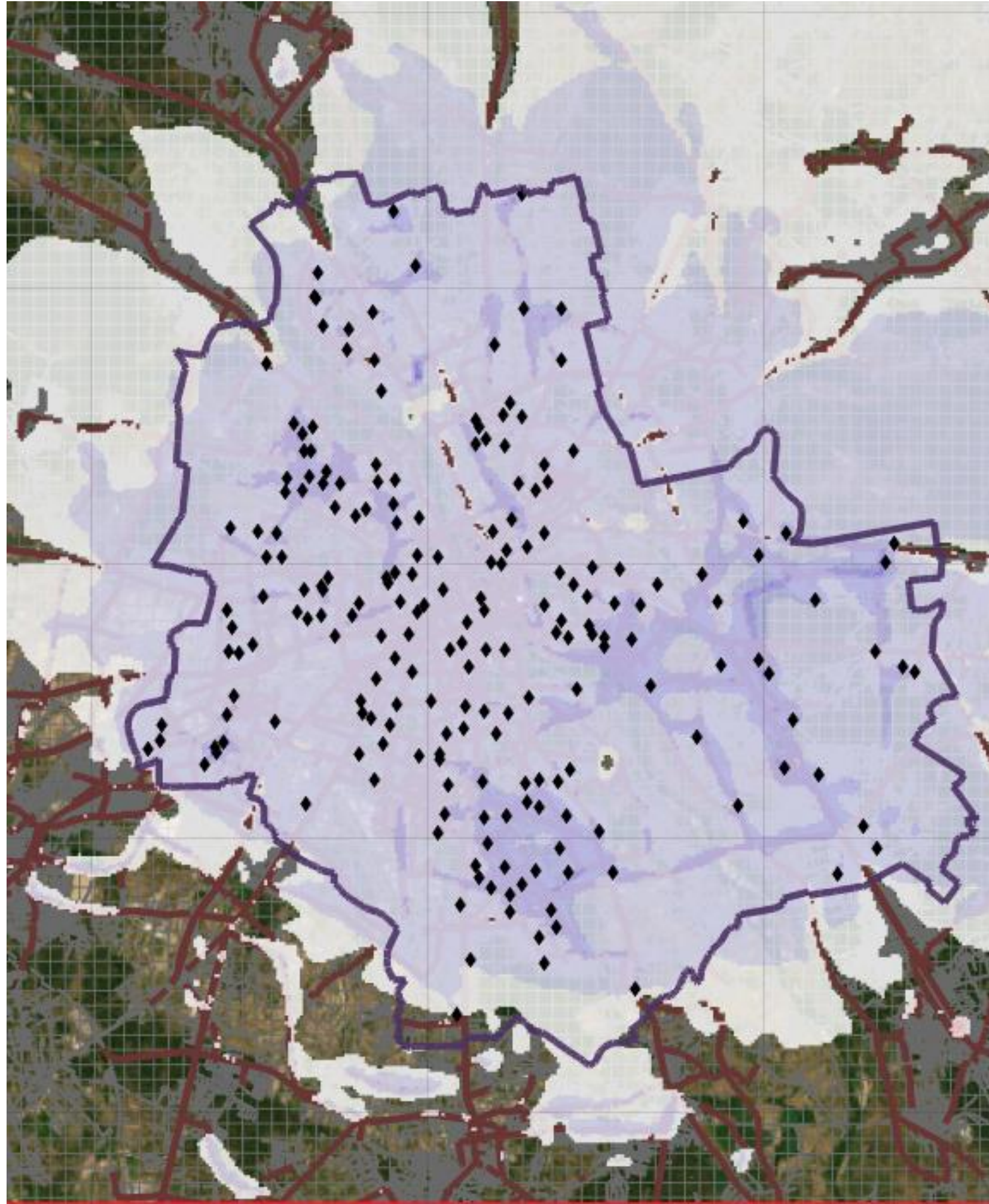


Scenario: No parental driving

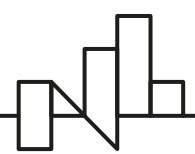
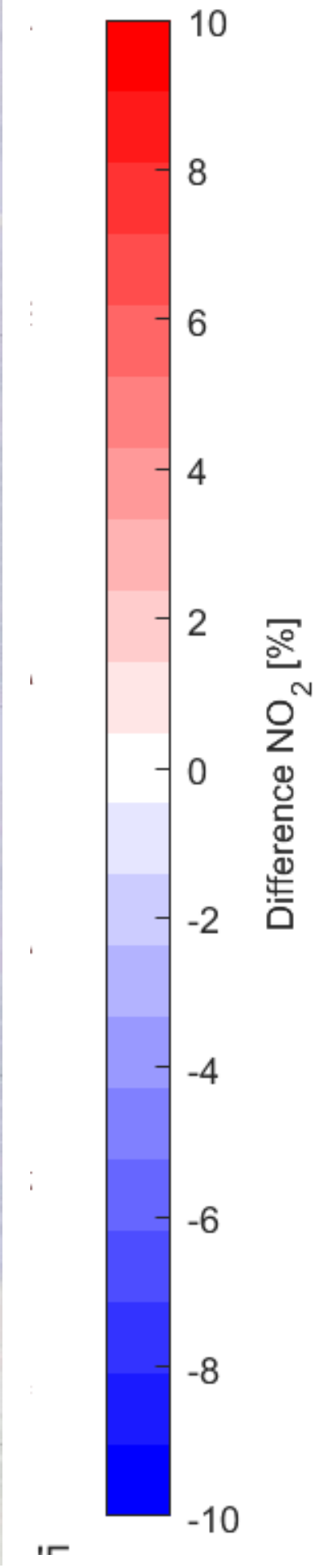
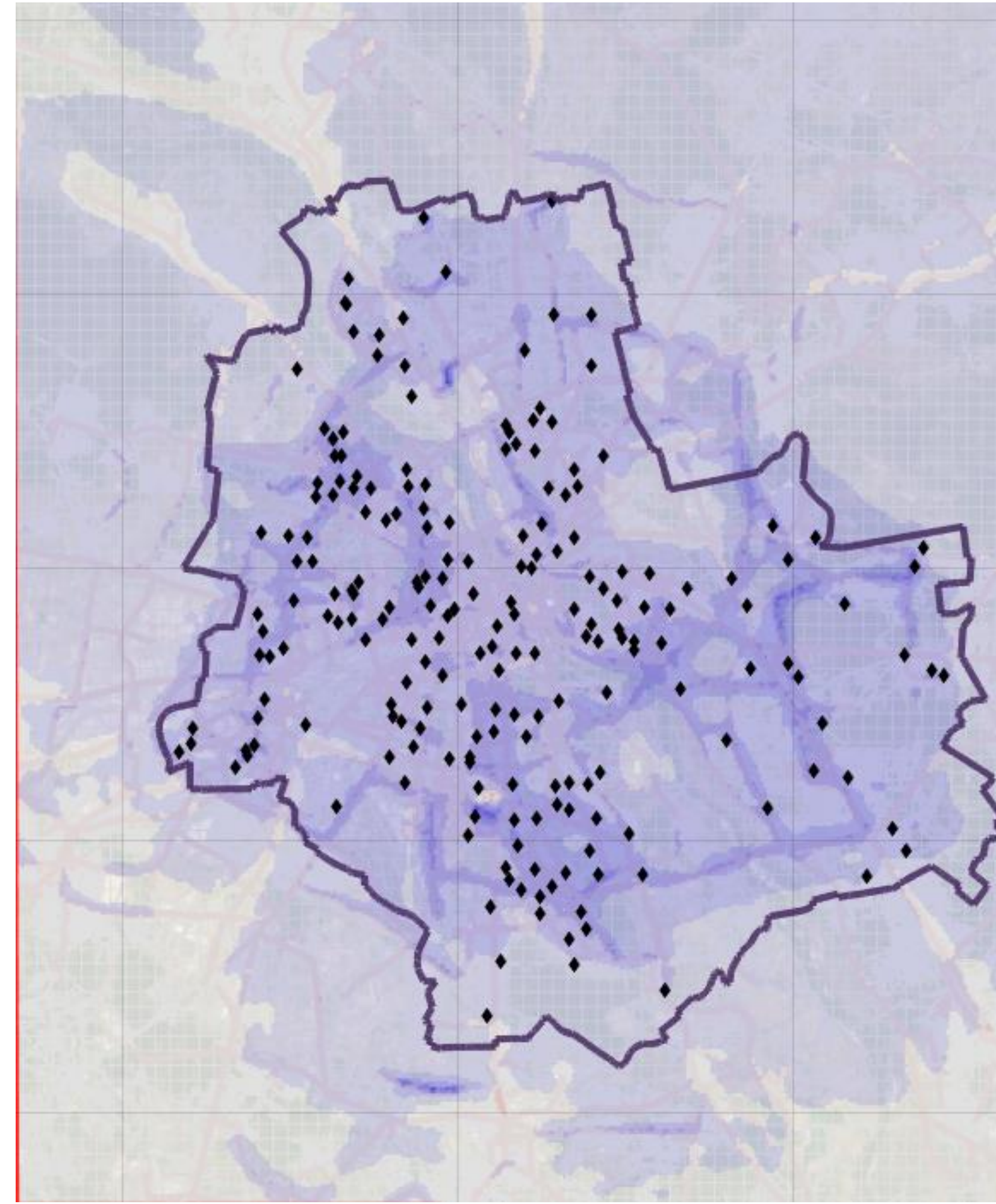


Warsaw scenarios: demand

Scenario: No school drive






Scenario: No parental driving








Take home messages

3 Schools

	Local	Global
Road capacity		
Parental driving		

200 Schools

	Local	Global
Road capacity	 	
Parental driving		

To diminish parent_excess:

- ❖ parking design at schools
- ❖ Parents awareness



[EN] Conclusions

1. Pick-up/drop-off zones are important areas of exposure for children.
2. 21% of children in average are driven to school in the three pilot schools.
3. Parents driving have an impact on the levels of pollution in this zones.
4. Careful pick-up zone design and parental awareness can improve local air quality (less cruising, less congestion, away from playgrounds).
5. Interventions by authorities need special care when AQ improvements are aimed.

[PL] Wnioski

1. Strefy odbioru i dowozu są ważnymi obszarami ekspozycji dzieci na zanieczyszczenia.
2. W trzech szkołach pilotażowych średnio 21% dzieci jest dowożonych do szkoły.
3. Rodzice jeżdżący samochodem mają wpływ na poziom zanieczyszczeń w tych strefach.
4. Staranne zaprojektowanie strefy odbioru i świadomość rodziców mogą poprawić lokalną jakość powietrza (mniej jazdy, mniej korków, z dala od placów zabaw).
5. Interwencje władz wymagają szczególnej uwagi, gdy celem jest poprawa jakości powietrza.



Thank you!

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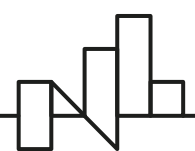
Overview

- Dynamics of transportation choices
- Pick-up zones layouts
- Driving behaviours

Emissions – quantity and location

Surface ambient air concentrations

Exposure



Observations and surveys to characterize parental driving behavior

Table 1: Input from in person observations to the travel behaviour component of the model

	377 Trocka	218 Kajki	34 Kruczkowskiego	An average school
Total no. of kids in school	541	623	435	533
			Delivery	
Total no. of vehicles delivering children [AM peak hour]	50	112	33	65
Total no. of kids delivered by car - A [AM peak hour]	58	130	38	75
Total no. of kids delivered by car - B [AM est. total]	73	208	50	111
Prevalence of parents idling	29%	43%	58%	43%
Prevalence of parents stopping on (designated) parking places	90%	43%	60%	58%
Average time of parental idling (minutes)	3.31	3.31	3.31	3.31
Average time of parental parking (minutes)	5.71	2.84	2.41	3.65
Average total time of parking	285.5	318.0	79.5	227.7
			Pick-up	
Total no. of vehicles picking up children [PM peak hour]	13	34	8	18
Total no. of kids picked up by car - A [PM peak hour]	15	39	9	21
Total no. of kids picked up by car - B [PM est. total - excl. 'late pick-ups']	40	117	22	59
Prevalence of parents idling	15%	19%	21%	18%
Prevalence of parents stopping on (designated) parking places	92%	58%	80%	69%
Average time of parental idling (minutes)	2.58	2.58	2.58	2.58
Average time of parental parking (minutes)	8.00	6.71	7.19	7.30
Average total time of parking	104.0	228.0	57.5	129.8



Observations and **surveys** defining parental driving behavior

Table 2: Input from surveys to the travel behaviour component of the model

	377 Trocka	218 Kajki	34 Kruczkowskiego	School average
Total no. of kids in school	541	623	435	604
Prevalence of diesel cars	40%	37%	28%	24%
Prevalence of hybrid/electric cars	4.3%	5.9%	7.1%	5.9%
Average car engine volume (cm ³)	1870	1836	1788	1713
Average car age (years)	9.7	8.9	8.1	9.6
			Delivery	
Total no. of vehicles delivering children	91	289	90	120
Total no. of kids delivered by car	98	348	100	133
Prevalence of parents idling	26%	39%	44%	37%
Prevalence of parents stopping on the road	3%	25%	16%	16%
			Pick-up	
Total no. of vehicles picking up children	90	228	70	109
Total no. of kids picked up by car	93	260	73	121
Prevalence of parents idling	10%	17%	35%	20%
Prevalence of parents stopping on the road	2%	12%	10%	11%
Sample size	209	161	148	229

