



# Analysing Traffic Noise Measures using Traffic Models

- Methods used in the EU project QCity

Pia Sundbergh

Div. for Transport and Location Analysis

KTH, Stockholm

Transportforum 2007, 11 January Linköping





## Outline

- ✓ Short introduction to QCity
- ✓ The KTH part of the project
  - ▶ Scenarios
  - ▶ Method description
  - ▶ Method results
- ✓ Ongoing work





## Background

- ✓ QCity – An EU founded project in the sixth framework, with 28 partners in 10 countries.
- ✓ QCity – A duration of 4 years, starting February 1st 2005.
- ✓ Supports the EU directive 2002/49/EC regarding noise mapping and action plans.

## Aim

A toolbox with different noise mitigation measures



### **Traffic Measures' Impact on Noise Levels**

- ✓ Traffic Control
- ✓ General measures to reduce car traffic
- ✓ Car ownership and car type choice
- ✓ Driver behaviour

#### Methods:

Traffic models and noise mapping software.

#### Study areas:

A suburb in Stockholm and a central part of Stockholm

### Traffic data input:

- ✓ Volume [Vehicles/h]
- ✓ Speed [km/h]
- ✓ Share of heavy vehicles [%]

Periods: Day, Evening, Night →  $L_{DEN}$ ,  $L_{Night}$

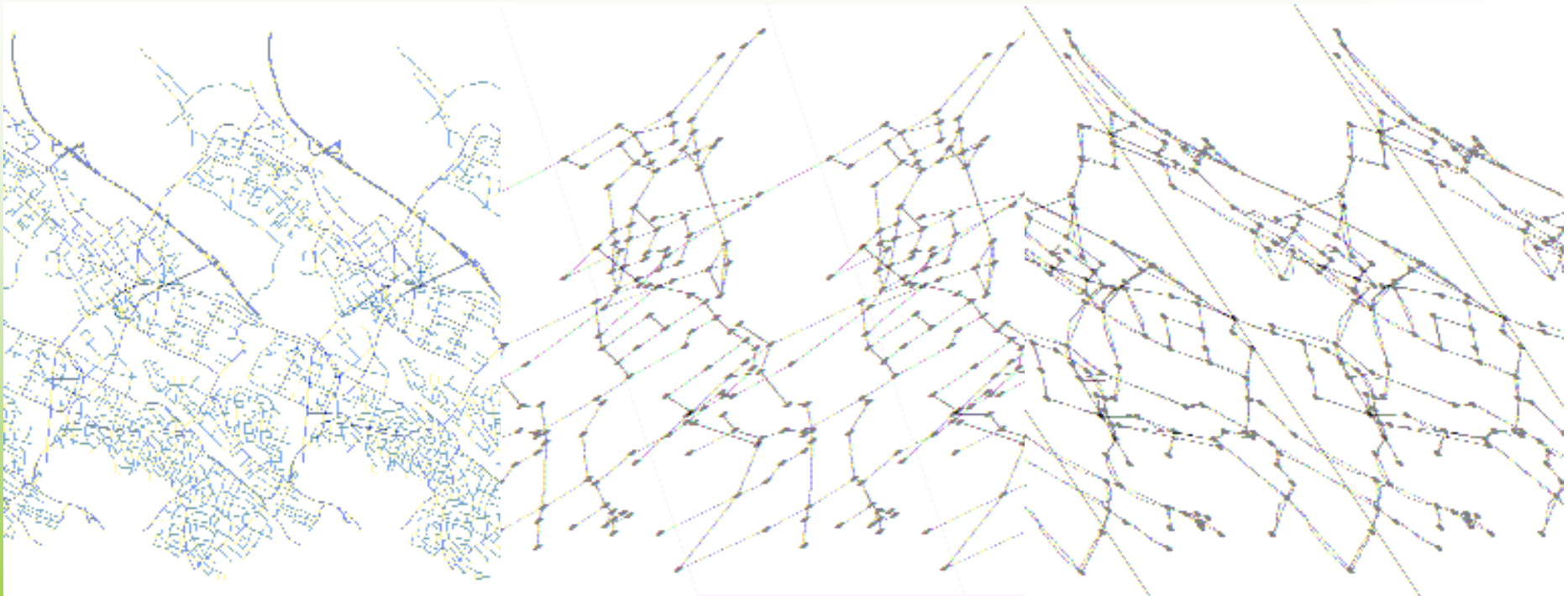
### The IMAGINE project

“There is no superior type of traffic model”

Choice of model depends on:

- ✓ Study area (main roads/urban area)
- ✓ Model currently in use
- ✓ Availability of data
- ✓ Measures that have to be assessed

## Geographical correspondence



Road network

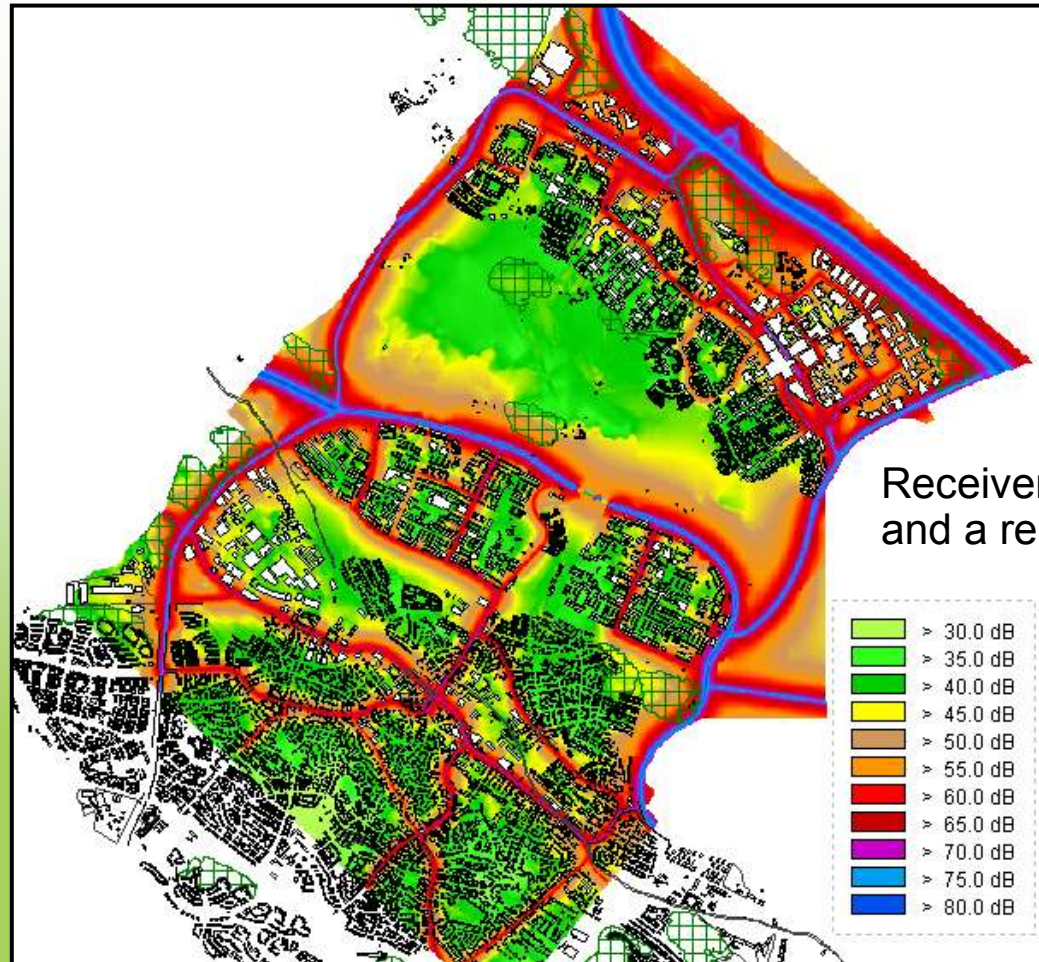
Model network

Matched road network

# Macro Simulation

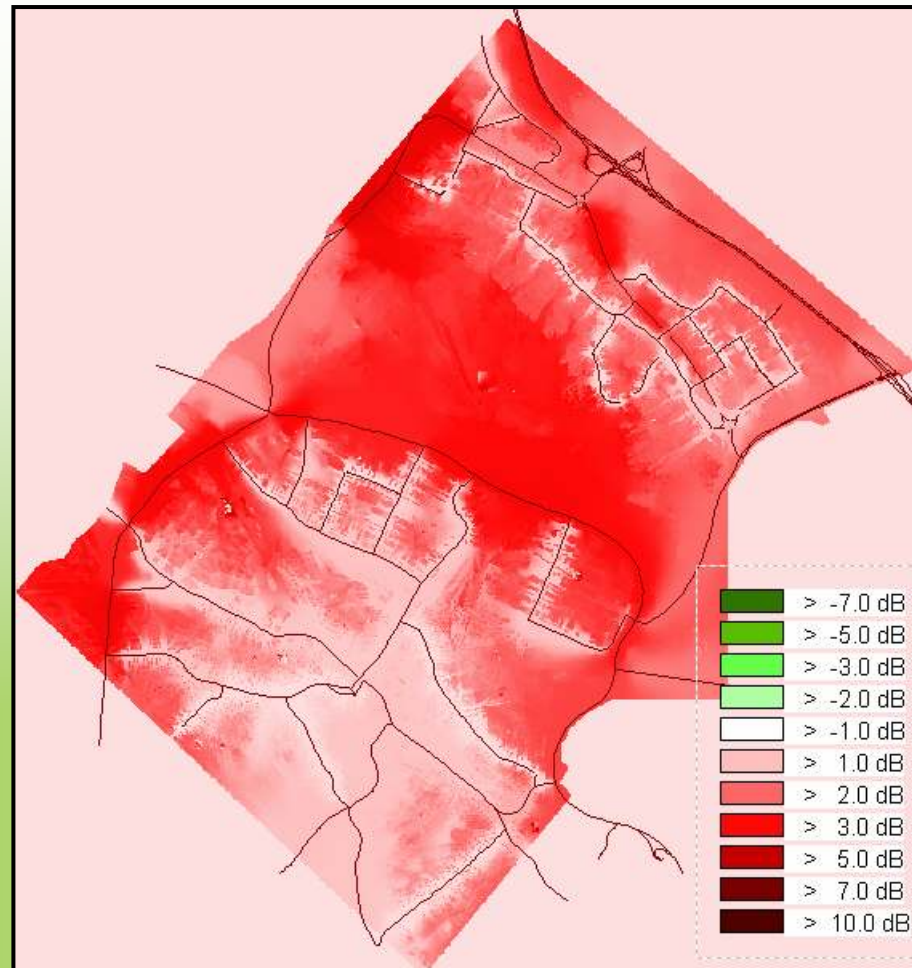
- Base scenario

$L_{DAY}$



## Macro Simulation

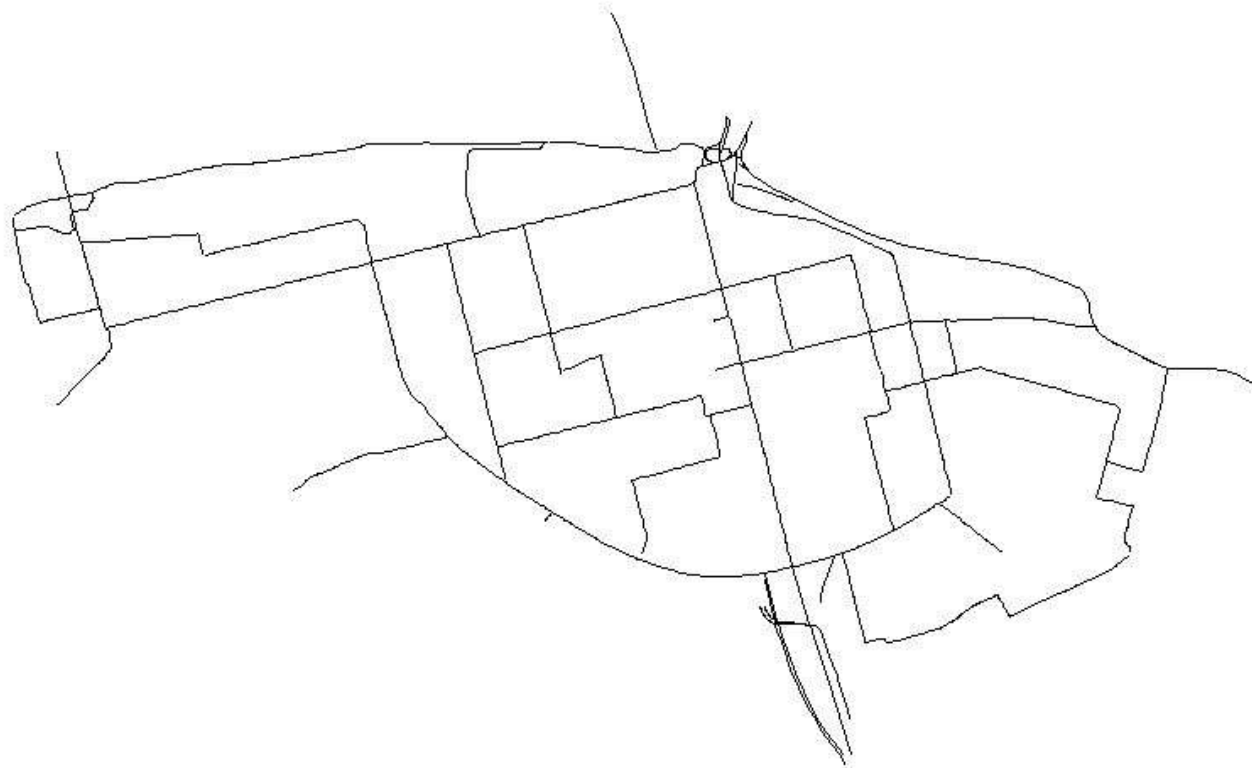
-Difference using speed limit  
instead of modelled speed



## Macro Simulation

- Create quiet areas

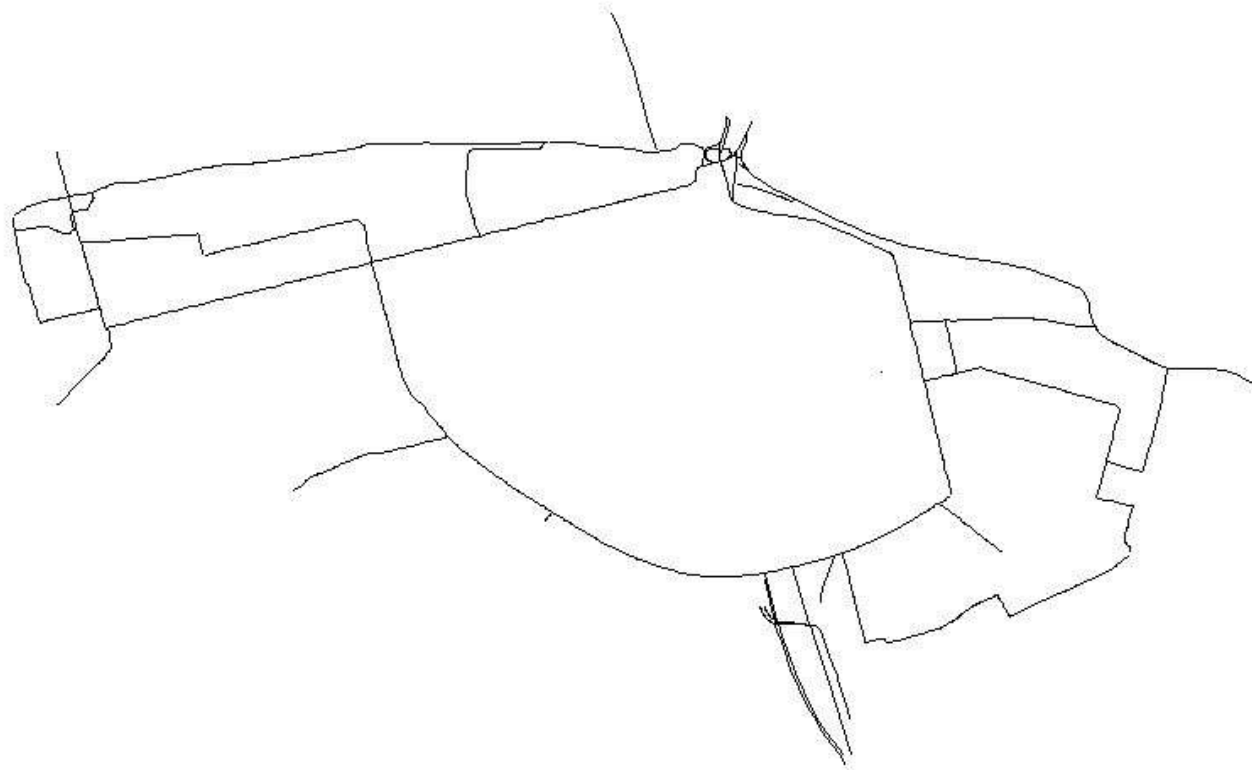
Modelled streets of Södermalm



## Macro Simulation

- Create quiet areas

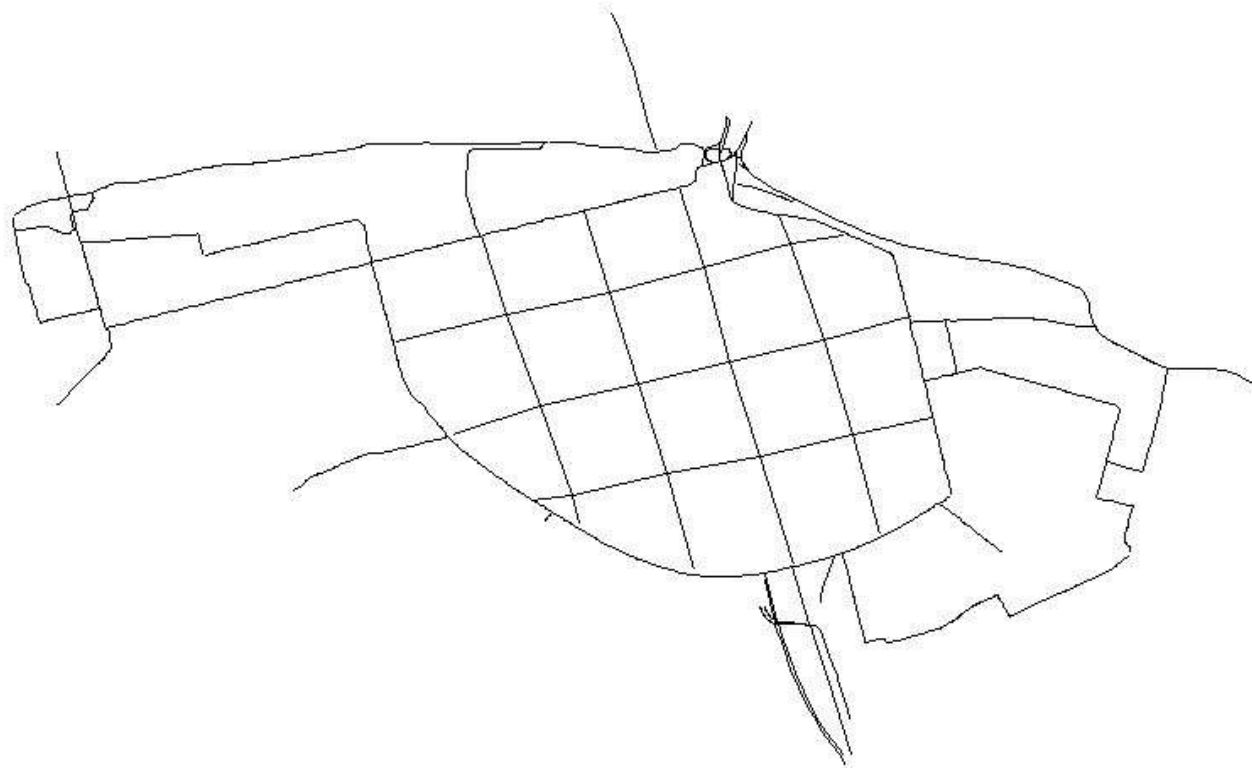
Modelled streets of Södermalm



## Macro Simulation

- Create quiet areas

New fictive network





# Macro Simulation

- Create quiet areas

Selection of modelled scenarios

Share of quiet vehicles owners <b>inside</b> area	Share of quiet vehicles owners <b>outside</b> area	Restriction for non-silent vehicle owners
5%	5%	None
100%	5%	Road barrier
20%	5%	2 €

**Possible choices for owners of none-silent vehicles:**

- Pay the charge
- Use parking garage and walk
- Change route
- Change travel mode
- Change destination





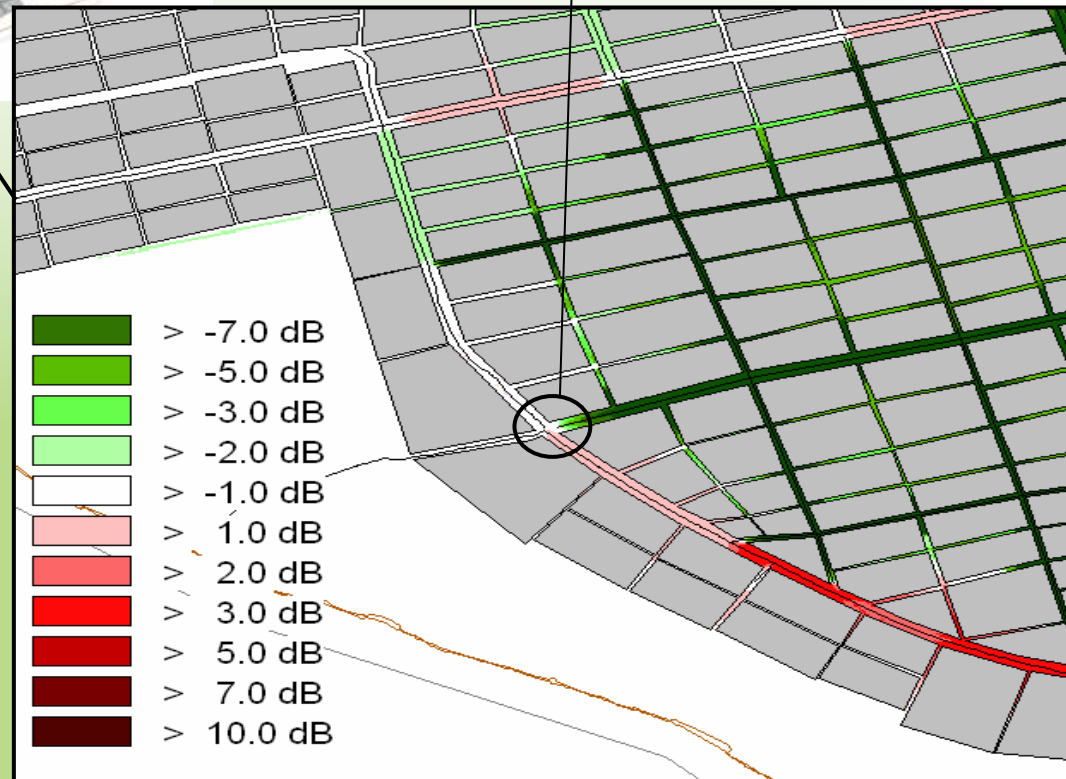
# Macro Simulation

## - Create quiet areas



No leakage effects by the barriers.  
(The noise level reduction due to decrease in traffic is greater than the noise level increase due to increased traffic outside the area)

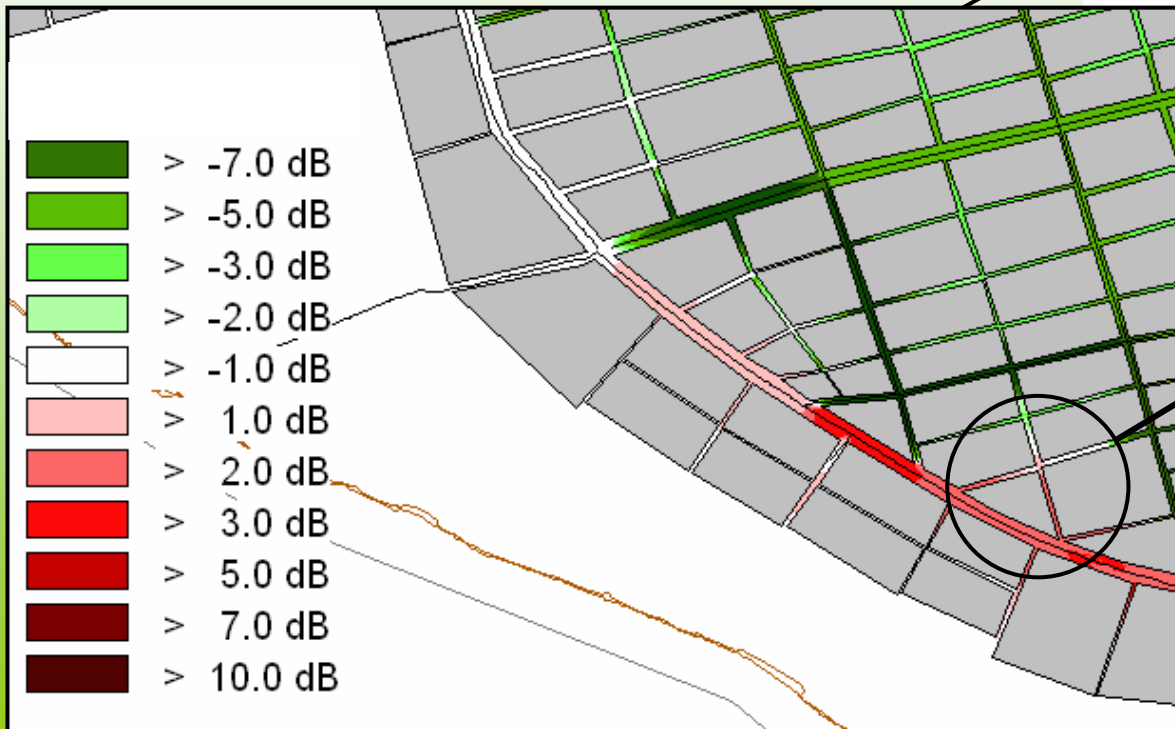
**Quiet areas** have been created within the “ring road” by prohibition against noisy cars



# Macro Simulation

## - Create quiet areas

**Quiet areas** have been created within the “ring road” by charging noisy cars 2 €.



Leakage 1-3 dB(A) on pedestrian streets approx: 150 m  
(Due to increased traffic on the ring road)

### At studies of:

- ✓ Driver behaviour impact on noise level
- ✓ ISA, Intelligent Speed Adaptation

### Method:

- ✓ Model different driver types e.g. “Speeder” and calm drivers
- ✓ Vary “Speed Acceptance”

### Noise calculation:

- ✓ Use model developed in the Rotranomo project





## Micro Simulation

### The Rotranomo model

- ✓ Dynamic model, use traffic data per vehicle and simulation step
- ✓ Considers gear shift, car type, road surface etc.
- ✓ Output:  $L_{eq}$  for reference point(s) per second or average

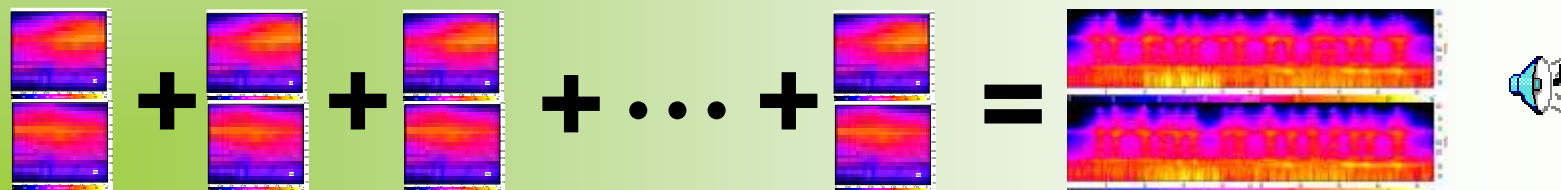
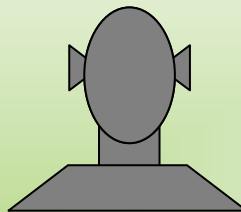
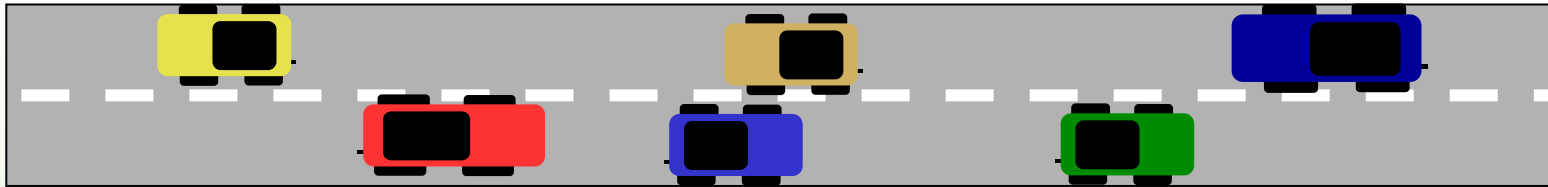
### Auralisation tool

- ✓ Developed by Head Acoustics (Germany) in Qcity
- ✓ To auralise and evaluate different traffic noise scenarios



## WP2.2.3 - Traffic noise synthesizer

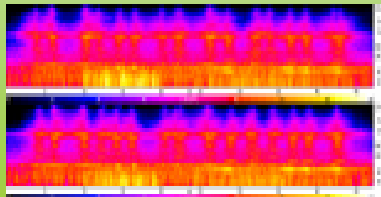
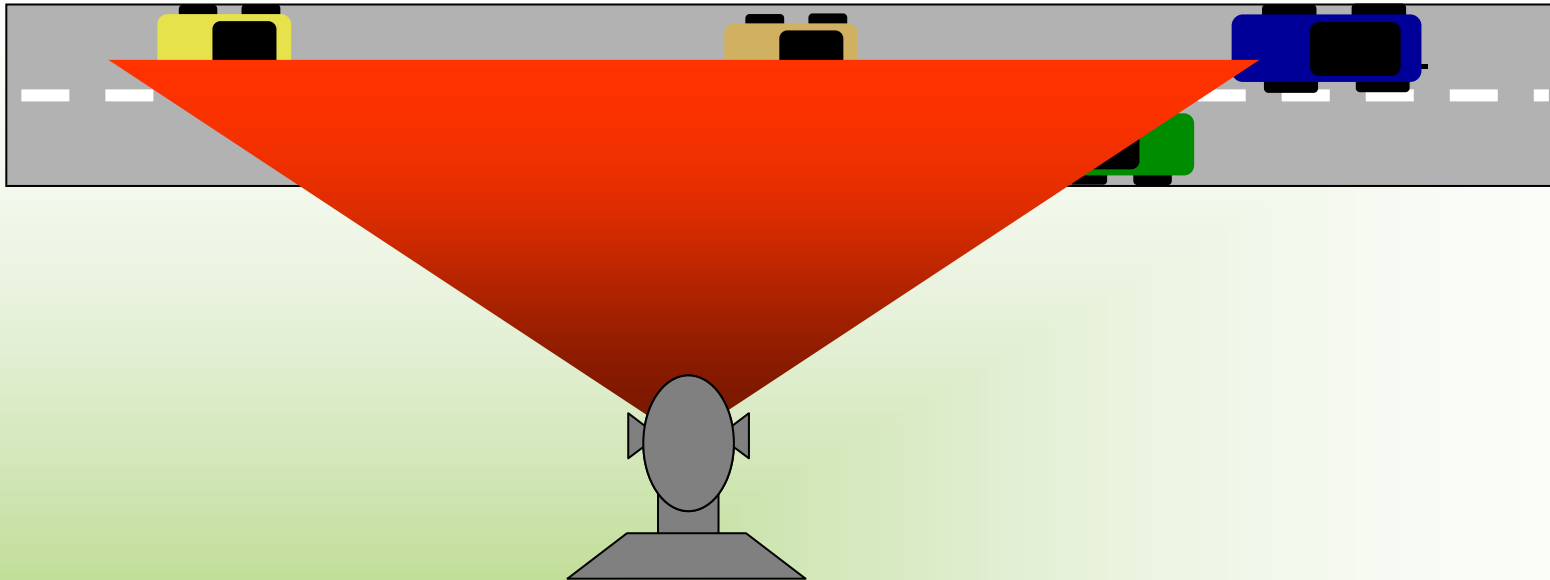
Development of a tool for the auralisation of  
time signals and propagation paths



**Synthesis of traffic noise**

## WP2.2.3 - Traffic noise synthesizer

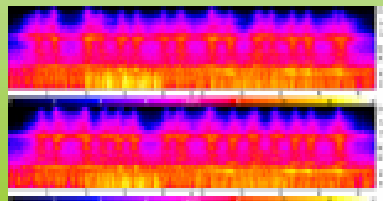
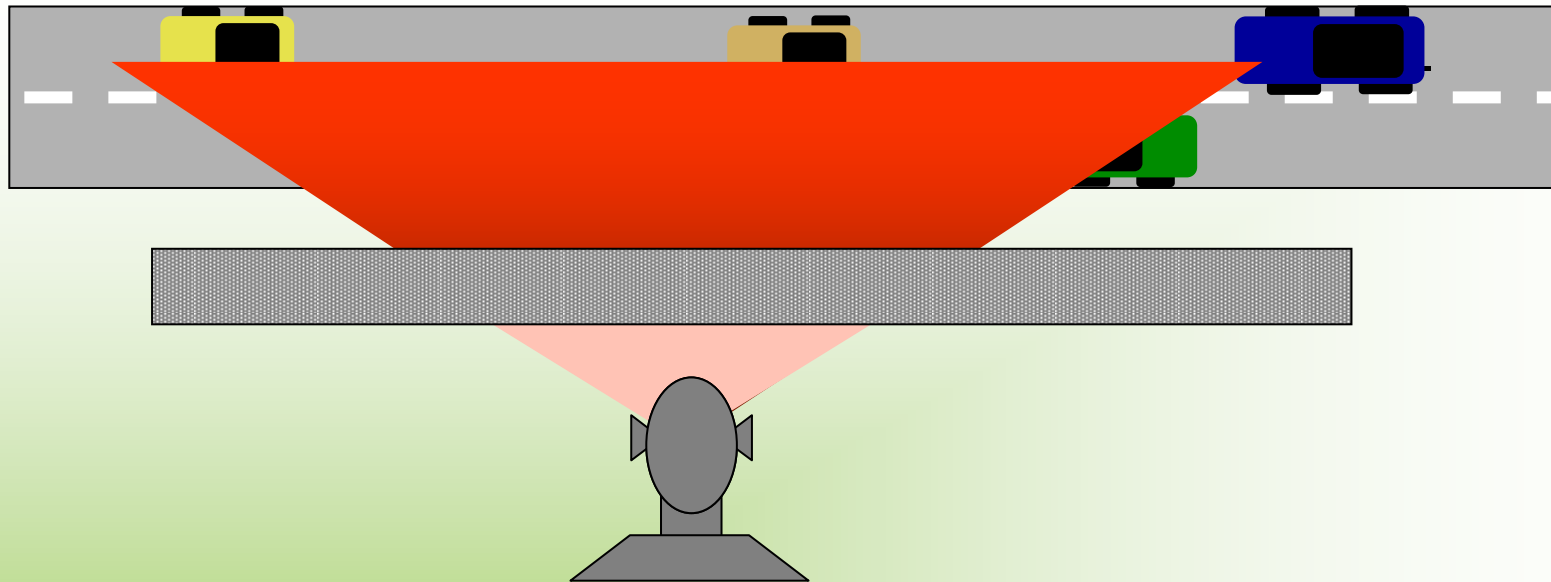
Development of a tool for the auralisation of  
time signals and propagation paths



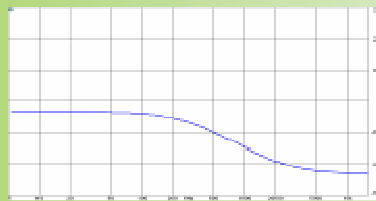
**Filtering**

## WP2.2.3 - Traffic noise synthesizer

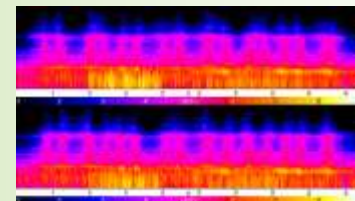
Development of a tool for the auralisation of time signals and propagation paths



\*



=



**Filtering**