Tackling urban soil and groundwater contamination caused by chlorinated solvents

This project has received European Regional Development Funding through INTERREG IV B.

INTERREG IVB

Veerle Labeeuw
OVAM

22 October 2012

9 partners:

NL Agency
Ministry of Infrastructure and the Environment

STUTTGART

ITVA

TOGETHER WE MAKE TOMORROW MORE BEAUTIFUL
VAM

ADEME

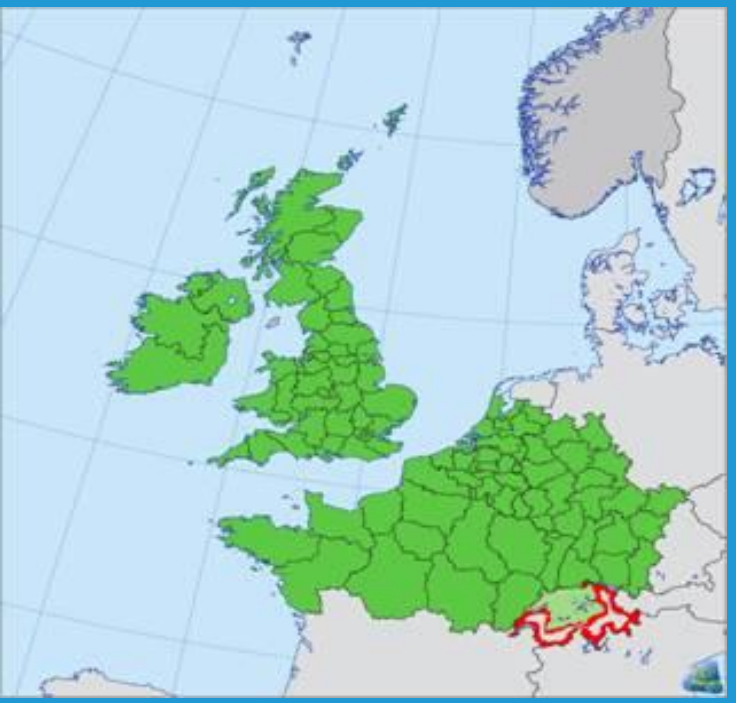
INERIS

Gemeente Utrecht

ghent: so much city

Mortsel
een stad vooruit

INTERREG IVB North West Europe (NWE)



The aim of this financial instrument of the European Union's Cohesion Policy is to

- stimulate transnational cooperation
- find innovative ways and tackle shared problems in the NWE region.
- touch the lives of citizens and thus contribute to a more cohesive EU society

The total research budget of CityChlor is 5.2 M. euro of which 50% is financed by Interreg IVB

www.nweurope.eu

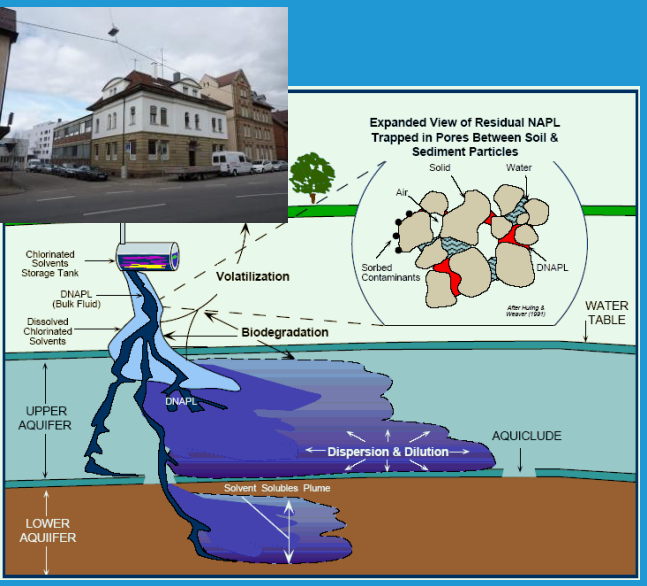
Investing in Opportunities

This project has received European Regional Development Funding through INTERREG IV B.

nwe

INTERREG IVB

Project's objectives: improve the quality and minimize the pollution of soil and groundwater



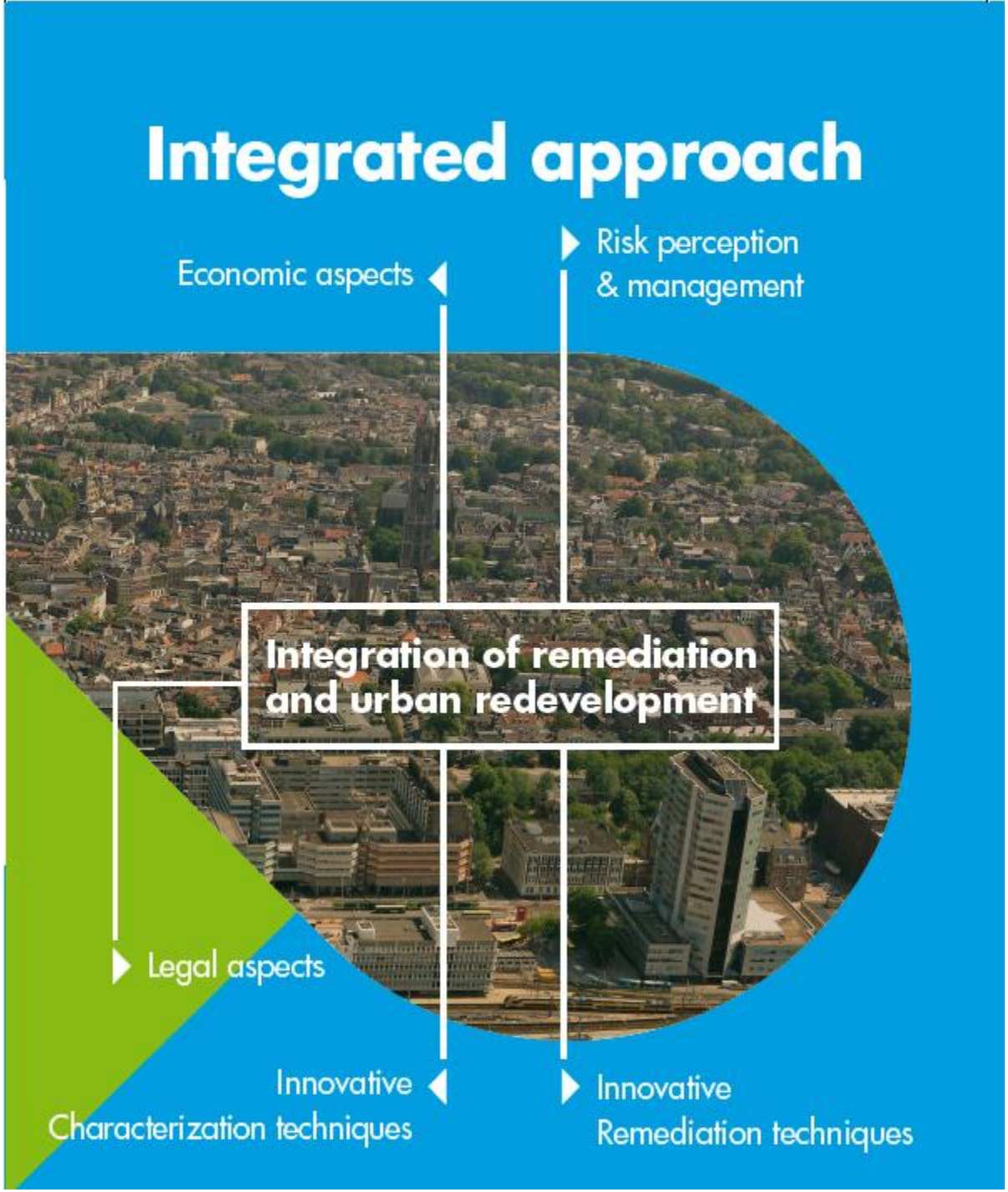
Problem?

- chlorinated solvents in soil and groundwater: hard to remediate and risk for health and environment
- often caused by companies with little capital
- urban environment poses additional limiting conditions for research and remediation
- common problem in all European cities

How?

Develop an **integrated approach** for remediation of chlorinated solvent pollution in urban areas, encompassing not only technical aspects but also aspects of communciation, socio-economic and organizational aspects

Integrated approach



Project steps to an Integrated Approach

Review and integration: starting with knowledge of experts from France, Germany, Netherlands and Flanders (*Inventory, overview of bottlenecks, regional and transnational workshops and dissemination seminars*

http://www.youtube.com/user/citychlor

Characterization & Remediation Techniques: research, exchange of knowledge and actual testing of innovative techniques at 7 pilot sites

Socio-economical aspects: impact of non technical issues on the solution of pollution problems. (*risk perception, financing remediations, possibilities of integrated approach in European legislation*,...)

Pilot tests CityChlor

- OVAM
  1. Use of iron for source treatment
  2. Charactarization techniques (Enissa MIP & RNS)
  3. Communication in remediation
- INERIS
  4. Characterization tools (Passive Samplers, …)
- Stuttgart
  5. Thermal remediation
- Utrecht:
  6. Area-scale monitoring
  7. ATES and remediation

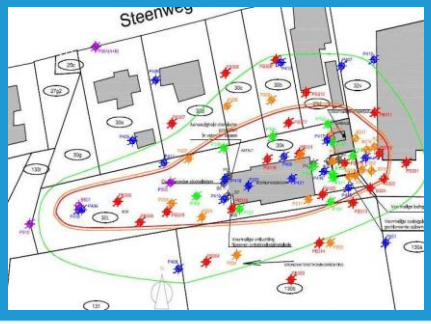
1. Use of iron for source treatment

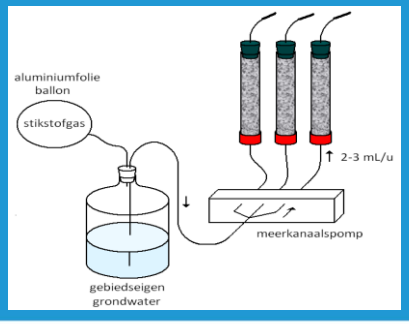
Degradation of VOCl is a slow and difficult process →

Iron can act as a catalyst

In CityChlor we tested the injection of nano iron particles & the cheaper micro iron particles on a site of a former printer.

This technique was until now mostly tested in labtest. On the field-tests are rare so very useful for remediation experts.





2. Charactarization techniques

Demonstration and validation of an innovative method for the detection and characterisation of the source zone of polluction with VOCl, including sinking layers

Selected techniques

ENISSA MIP = (MAVA) technique that allows meas individual components (Quantitative as well as qualitative) until ca. 10 µg/l. With this technique a full characterization of pollution (intervals of 30 cm) is possible and a large amount of data can be collected in short time.

Ribbon NAPL sampler =(URS) technique that can give precise information on the vertical spreading of pure product.

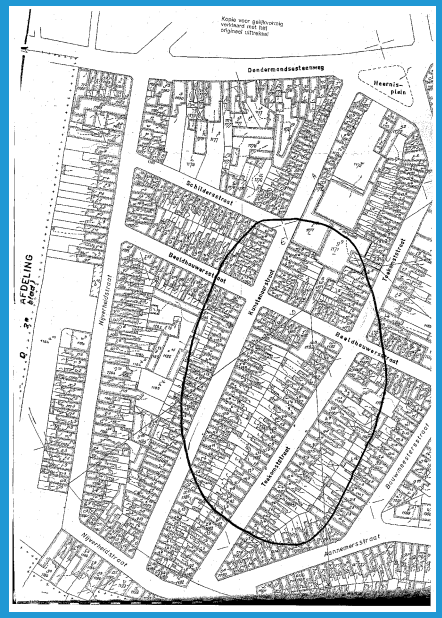
Investment is finished. Outputs:

- Demonstration during seminar on “Innovative techniques in investigation” (Kortrijk, 17/05/11)
- Detailed report on the investments (Dutch + English summary) + **movies on You Tube**

3. Communication & Risk Perception

1. Socio-psychological test to measure the impact of communication during remediation projects

- Literature Study and Survey done by University of Ghent
- Survey is done in November 2011: result:this pollution doesn't cause any stress because the citizens felt well informed and had the feeling of self-controlling the risk (by not using groundwater)



2. Development of checklists and communication material to help the cities and experts

Inspired by PARCOMBO (Bodem+), C Factor (Utrecht), Communication at remediation projects (OVAM), COMRISK (INERIS), and based on the results of the sociological study done for CityChlor.

4. Characterization tools

Successive use of DPT, Passive samplers, groundwater sampling soil sampling, soil air and indoor air sampling

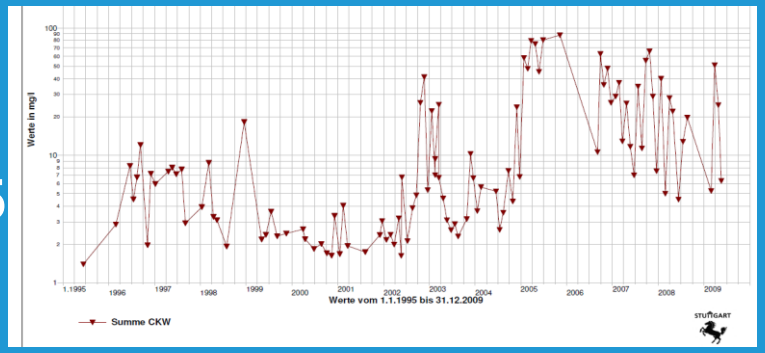
- **DPT: CPT/MIP/BAT sampling outside and i**
buildings (movie)

- **Groundwater characterization**
(Passive Samplers & Long term monitoring)

- **Soil characterization (Soil and Soil Air Sa**
+ Indoor Air measurements)

5. Thermal remediation

Stuttgart-Feuerbach: Thermal remediation



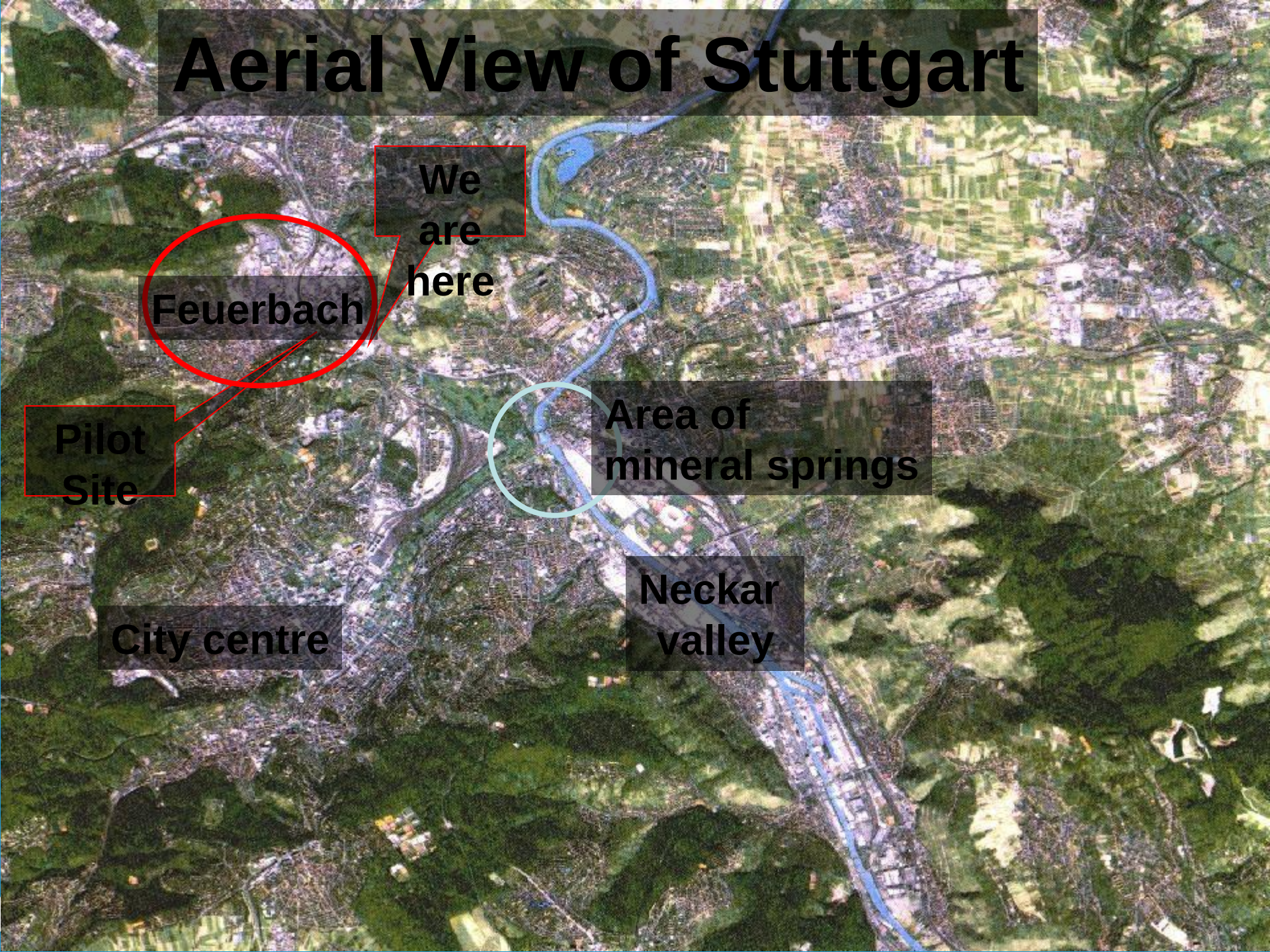
- Pump & Treat since 1994
- CHC-Concentration since 1995

- New remediation techniques?

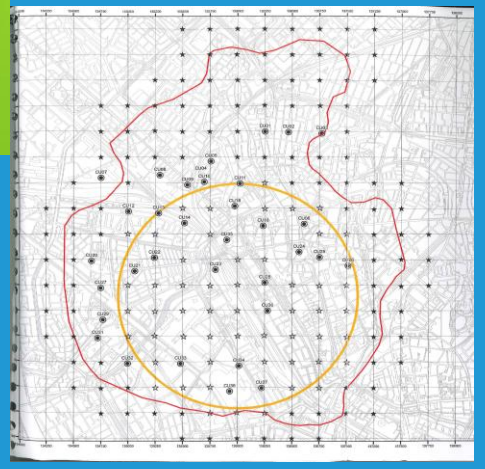
- Overlapping large boreholes

- TUBA: In-situ remediation by steam-injection and soil vapor extraction

- THERIS: In-situ remediation by thermal enhanced soil vapor extraction (thermal wells as heat source)


Aerial View of Stuttgart
We are here
Feuerbach
Pilot Site
Area of mineral springs
Neckar valley
City centre

6. Bio-process monitoring



- Pilot site in Utrecht (Nl)

Large scale groundwater pollution:
- pollutions largely mixed
- Area of circle (phase 1): 400 ha

➔ appr. 60 million m^3 polluted groundwater

Total area (phase 1 & 2): 900 ha

➔ appr. 125 million m^3

Sustainable soil energy:

- ATES-systems: >7 million m^3/year
- > 6.000 kton CO_2-reduction/ year

Monitoring network grondwater: grid 250 - 250

Conceptual Site Model on www.citychlor.eu

7. ATES and Remediation

Pilot site in Utrecht (Nl): Ates is installed

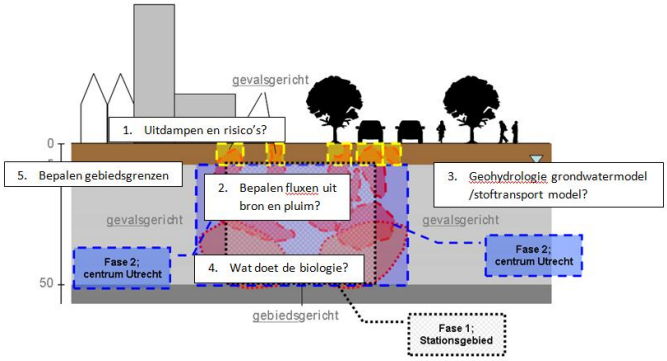
Facilitating: making activities in subsoil possible
Legal status: phased approach of partial remediations
Focus: VOC's in the first aquifer (1e WVP), from 5 – 50 m bgs
Action values: for human risks & spreading
Prognosis: on flux & concentration levels

 forecast load reduction bio-washing VOC's = 40%

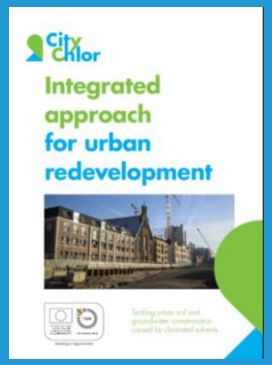
Influence of ATES-wells (8 million m3 / year):

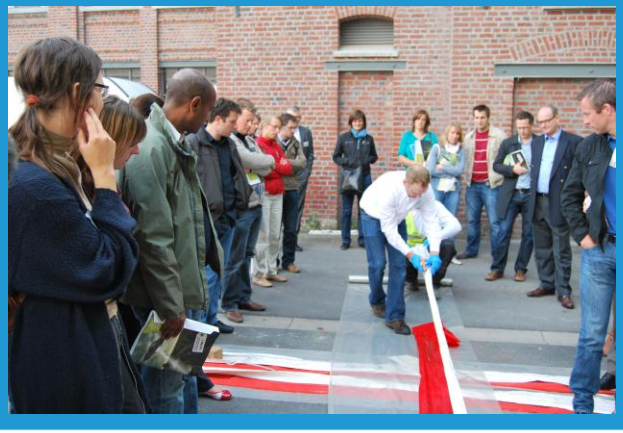
- mixing area = change of groundwater level > 0,25m

- mixing effect = geohydrological effect
(sorption, dilution, etc)



Workshops & Demonstrations





Final Conference
16-17 May 2013 Ghent

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www.CityChlor.eu

youtube

linkedIn