

Balancing 4P's including the subsurface

How brownfield remediation can help urban development in M4H harbour transition area in Rotterdam

6 september 2018, Riga

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Structure presentation

- M4H transition harbour area
- Brownfield remediation.....
-Urban development
- Subsurface Balancing 4P's
- Results of implementing 4P's in M4H including the subsurface





Subsurface Balancing 4P's

Subsurface as a natural system



Bron: Actueel Hoogtebestand Nederland (AHN)

Below sea level



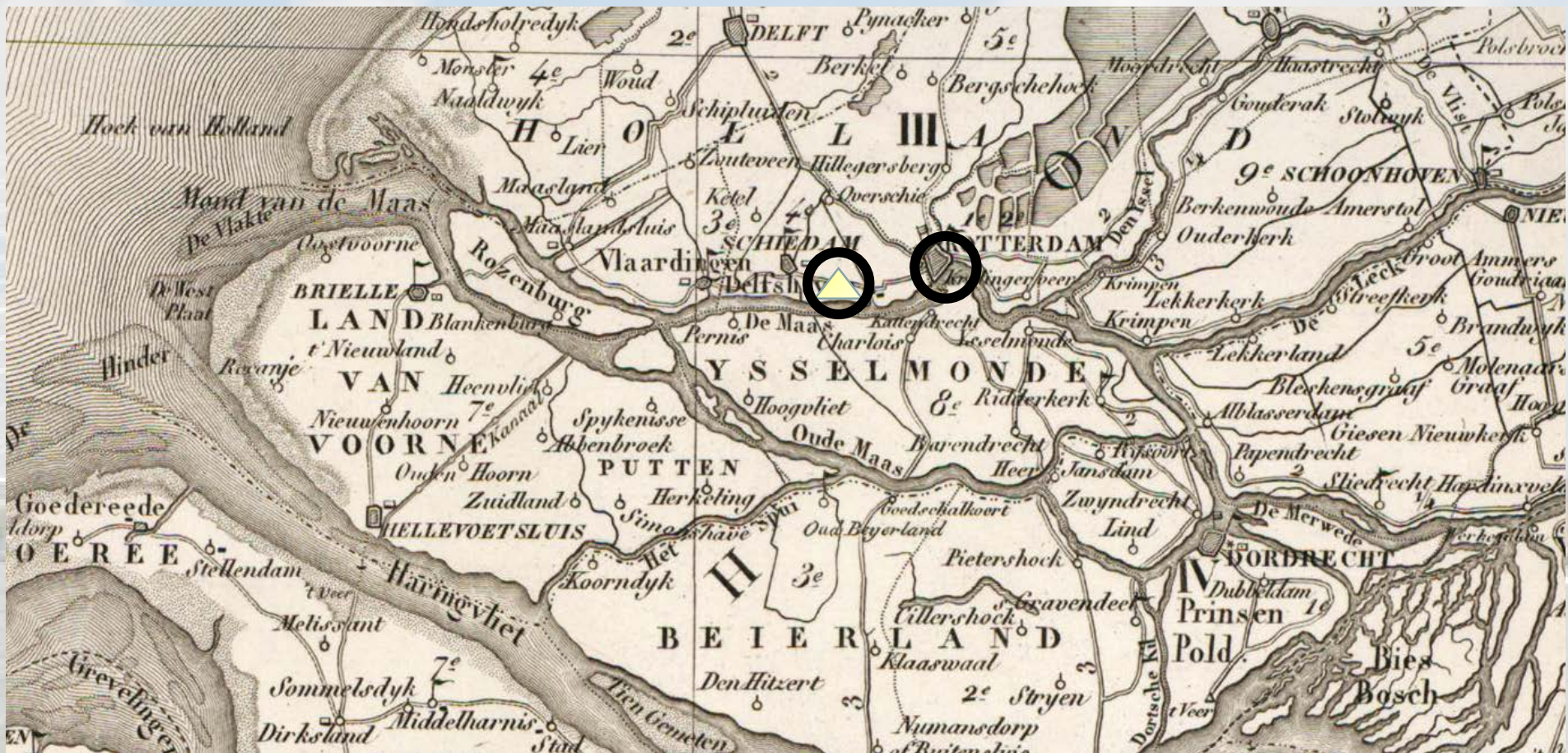
Water boards (since 13th century)
Responsible for (ground) waterlevel



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Transition M4H – urban development over the years

Rotterdam 1830

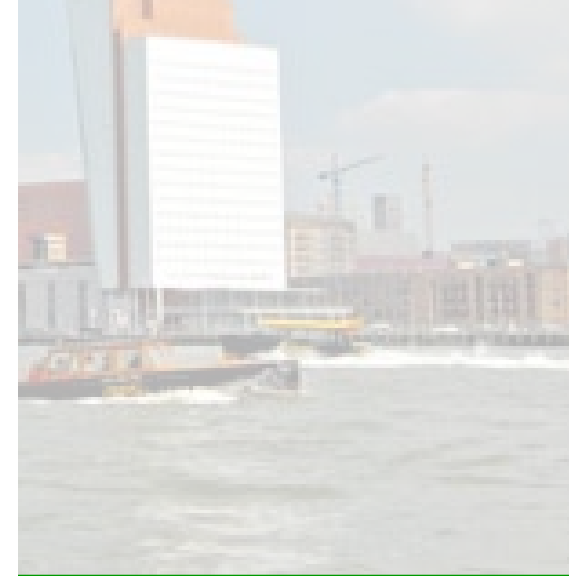


Transition M4H – urban development over the years

Rotterdam 2017



M4H transition



Transiton M4H ambitions

- From harbour to urban innovation district
- Organic development (2010 – 2040) - working and living (>2025)
- Creative make industry, cleantech / food / health (makers district)
- Better connections to city centres of Schiedam and Rotterdam
- Better liveability (greening)
- Climateproof and resilient





Transiton M4H charasteritics

- Harbour area 80 – 100 years old still in use
- Polluted soil, heavy metals (Pb, Zn, Cd) and organic pollutions (oil, tar, benzene)
- Other environmental challanges
- Monuments (gasholder)
- Brownfields
- Soil is mostly paved and covered
- No connection with a natural riverbank



Transition M4H current situation



Transition M4H current situation



Transition M4H current situation



Transition M4H



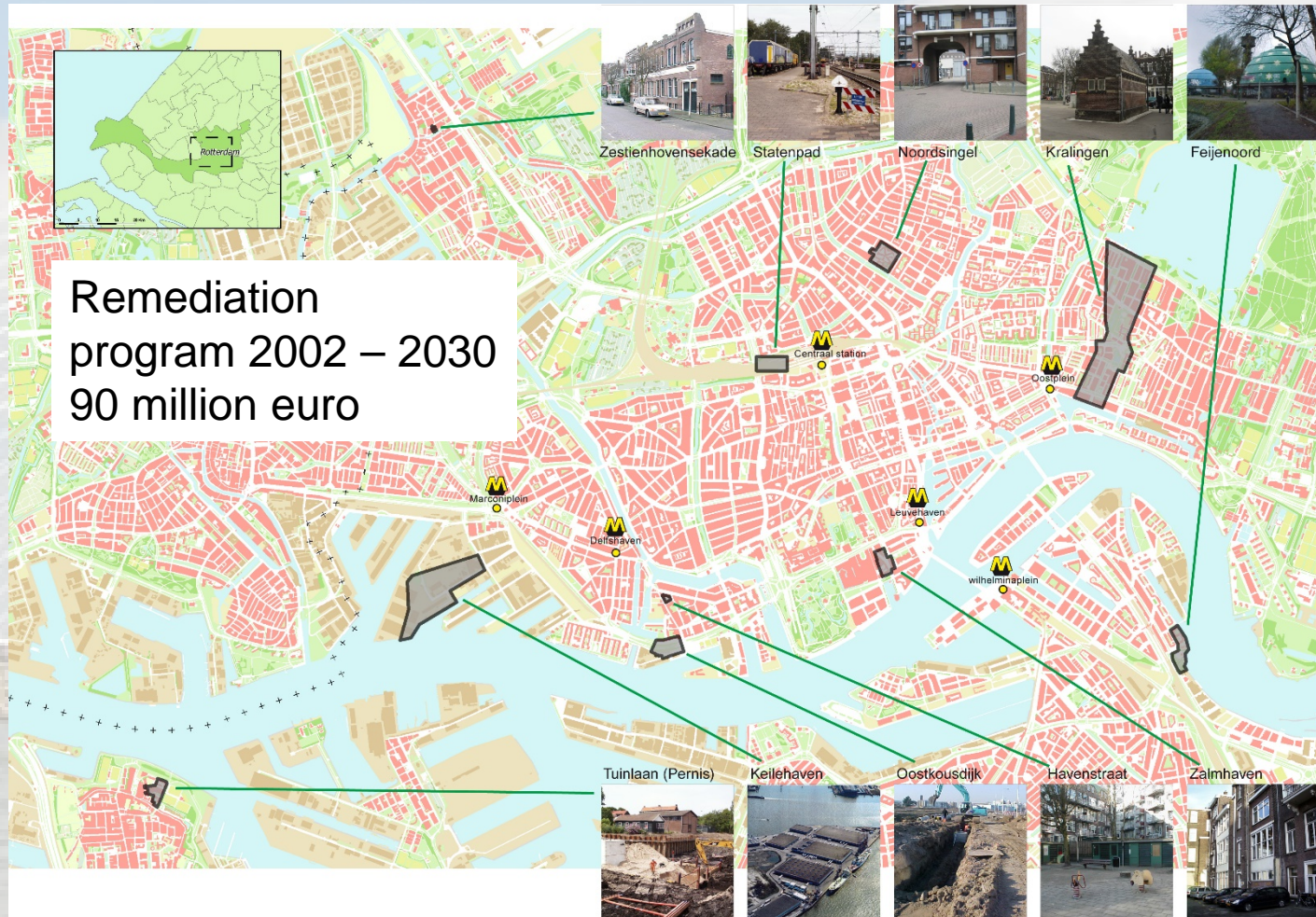
Transition M4H – temporary urban farming



Brownfield remediation M4H former gasworks Keilehaven

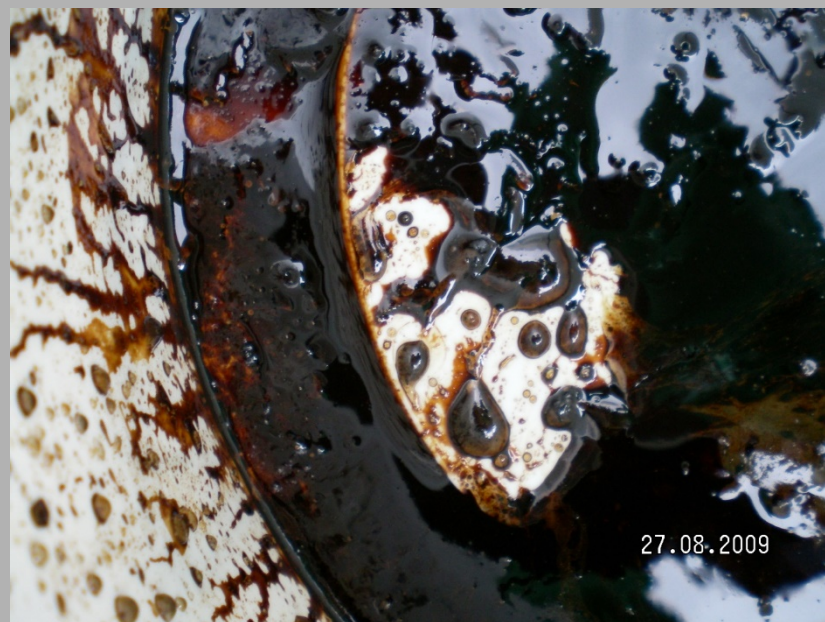


Brownfield remediation Gasworks locations Rotterdam



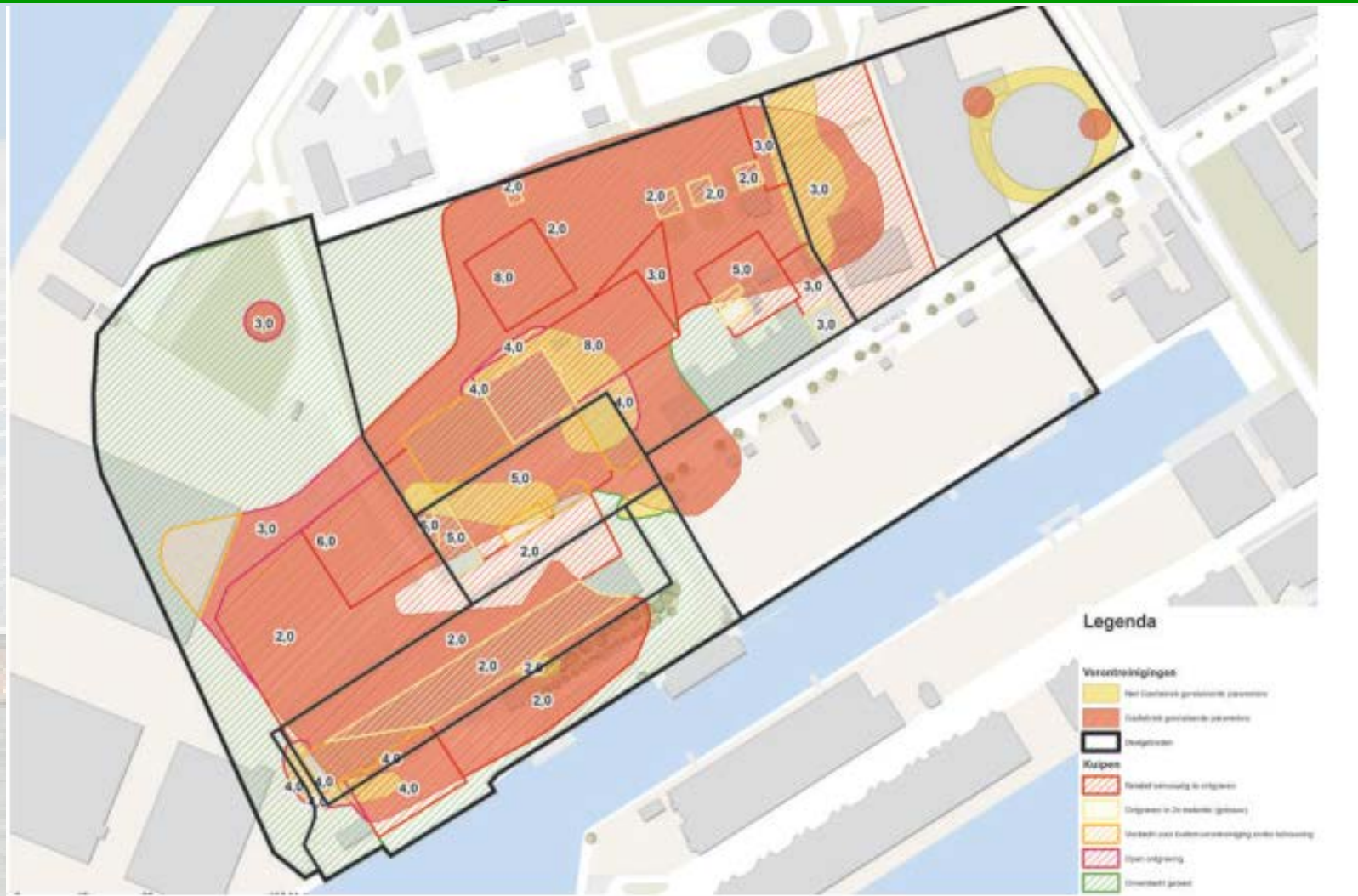


Tar pollution from
a gasworks location
(Feijenoord)

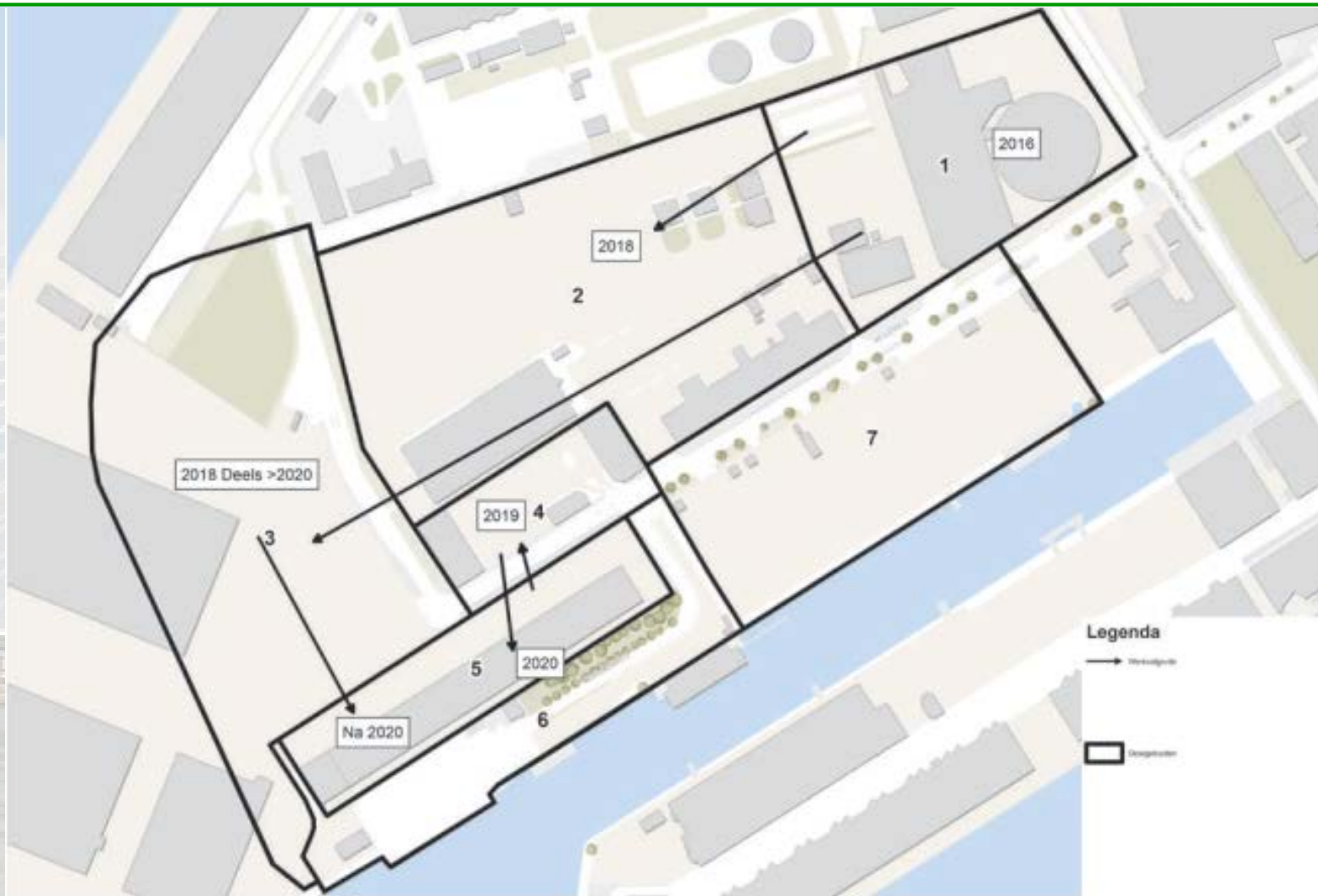


Brownfield remediation M4H

Polluted area gasworks Keilehaven



Brownfield remediation M4H original remediation phasing



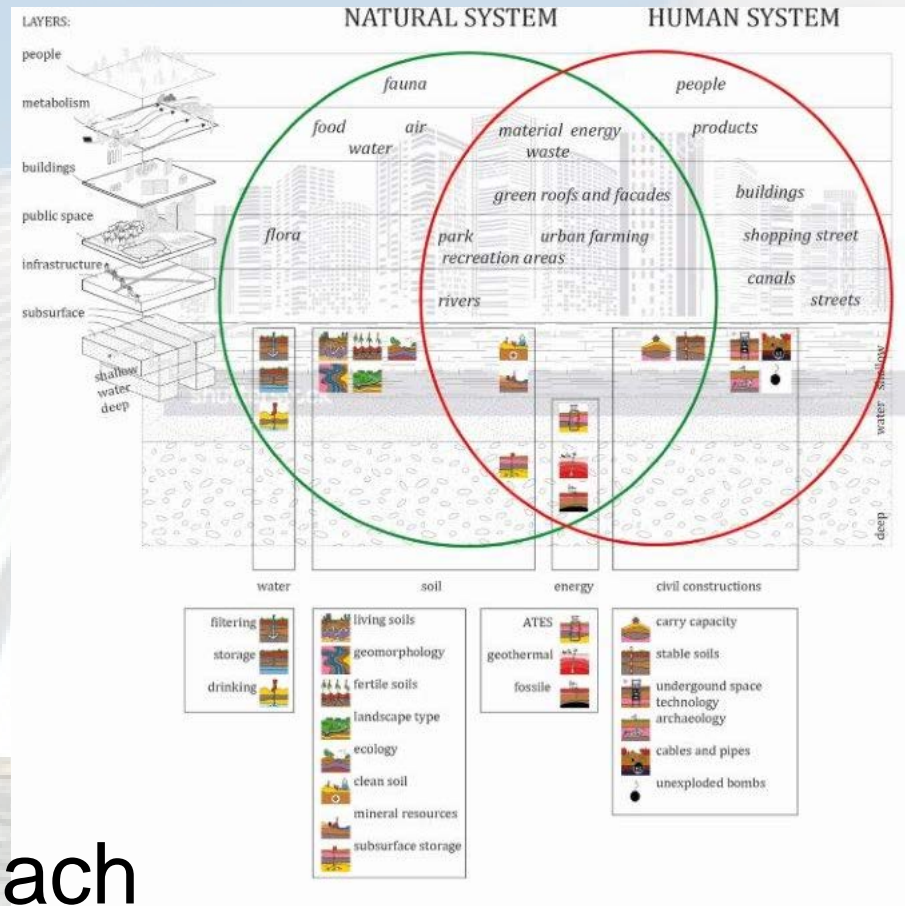
Brownfield remediation M4H – phase 1 2017 -2018



Brownfield remediation M4H, piles and concrete foundations



Broadening the scope from Remediation to urban development balancing natural and human system



A holistic approach



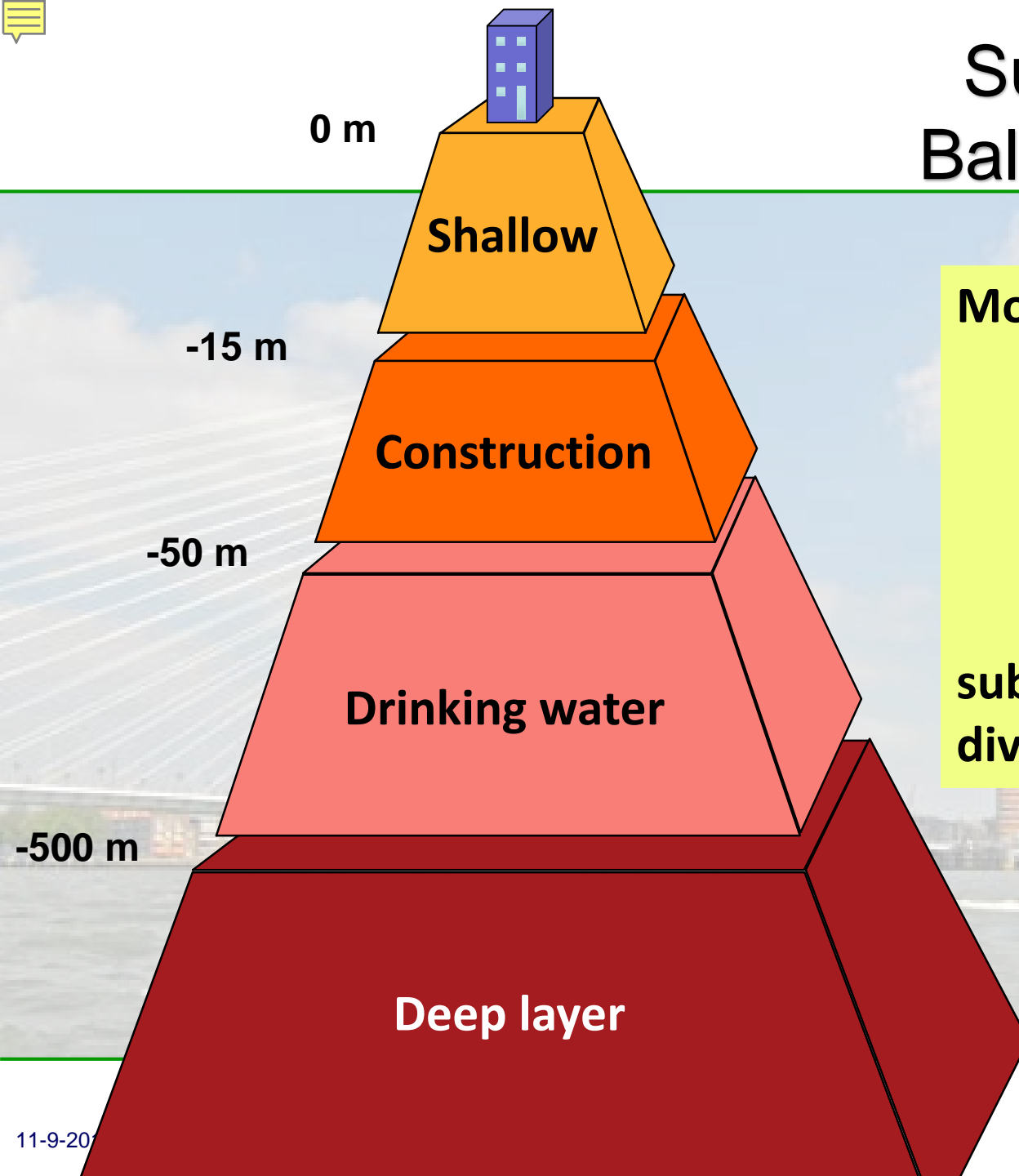
Subsurface Balancing 4P's

Urban planning including subsurface in Rotterdam:
the slow road from awareness to standard practice.



2007 – 2018

Subsurface Balancing 4P's



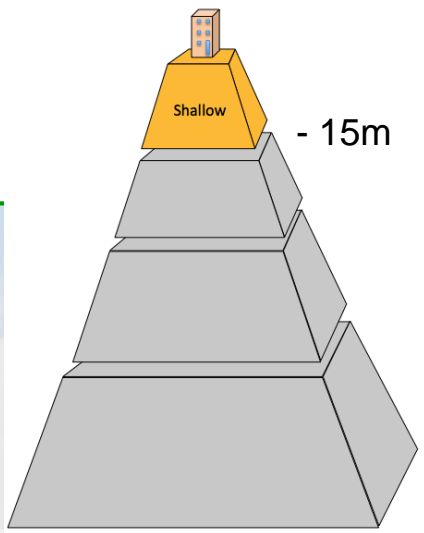
Model based on:

**Geology
Usage
Legislation**

**subsurface of Rotterdam
divided in 4 layers**

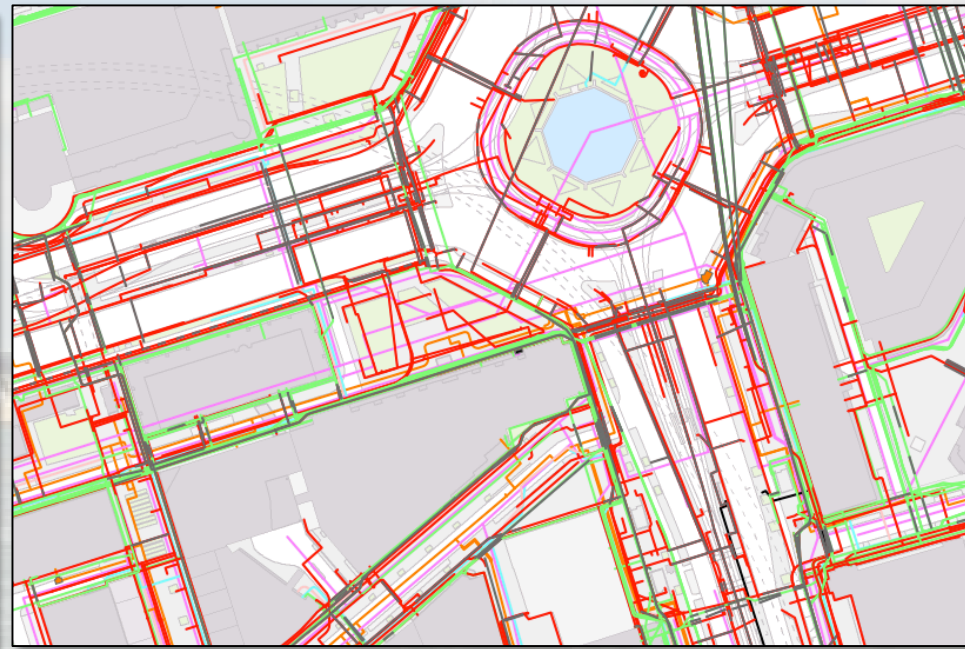


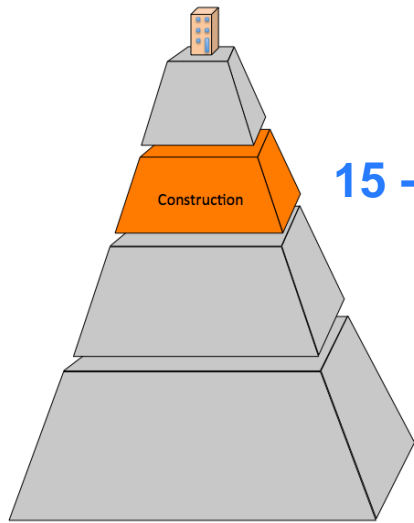
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Settlement of Peat and Clay: safety, economical, health

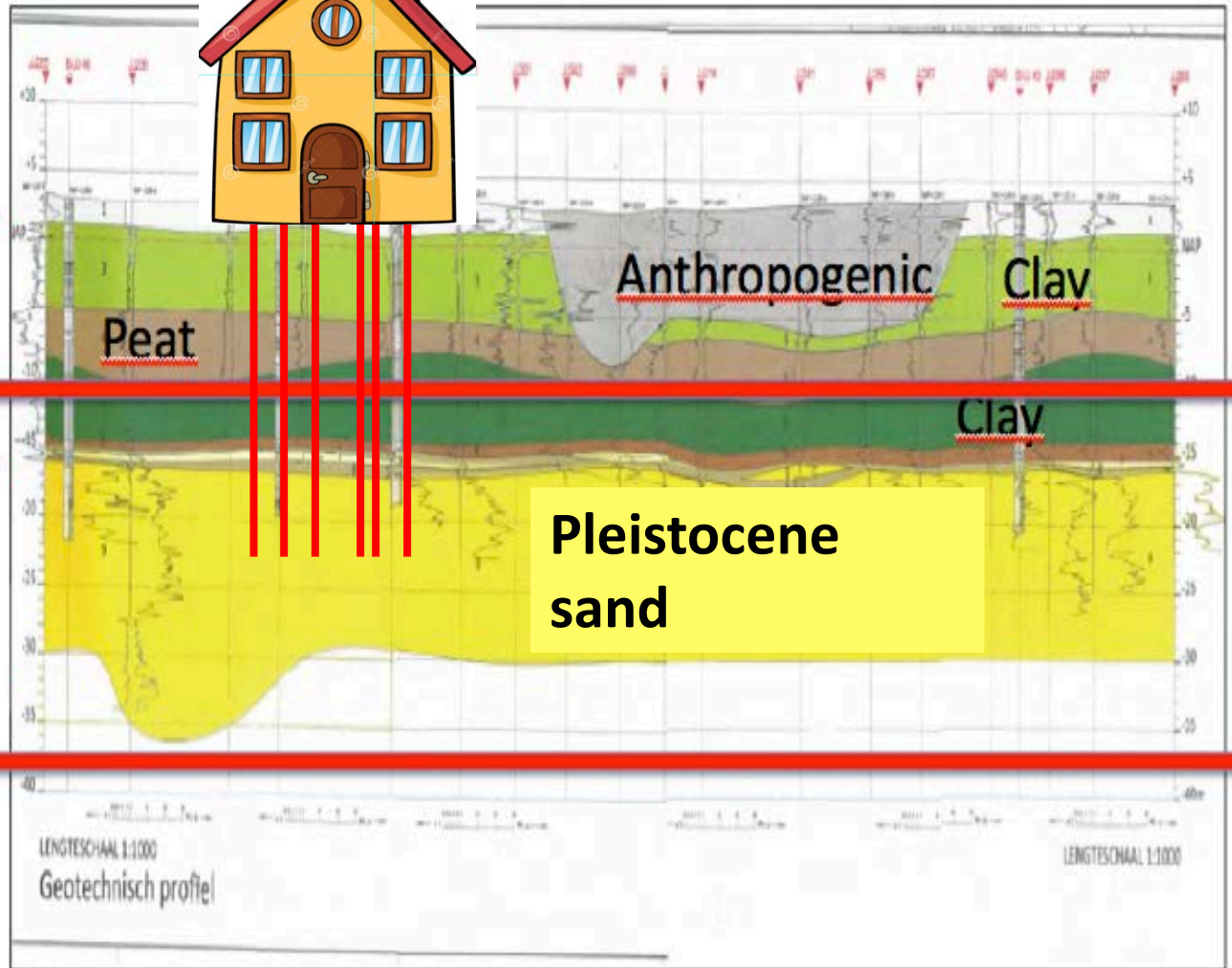
- Pile rot
 - Damage of roads
 - Broken cables and pipes
- (Contamination of groundwater)





Construction layer

0 m



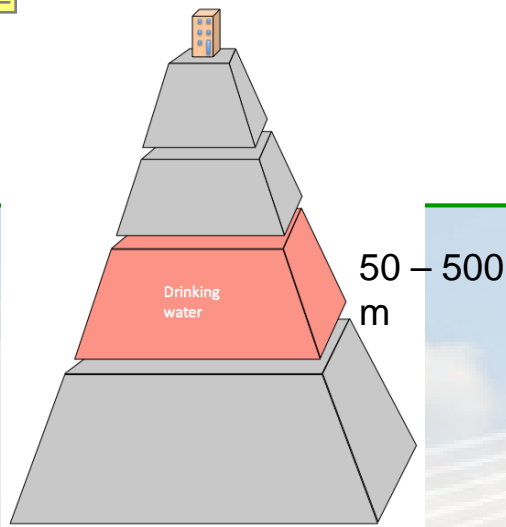
15 m

50 m



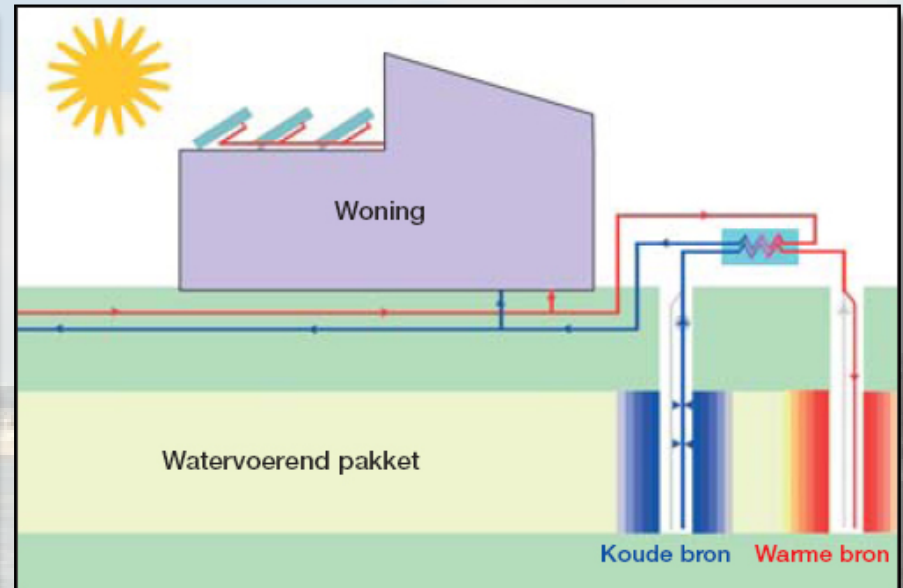
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Drinking water



Environmental, Health

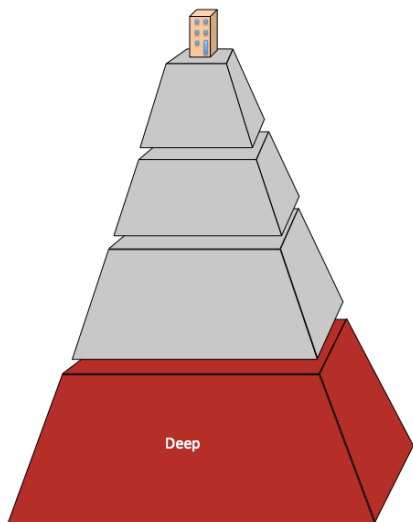
Shallow Geothermal Units (aquifer storage)



*Smart Combinations between SGU and
remediation of shallow layer*



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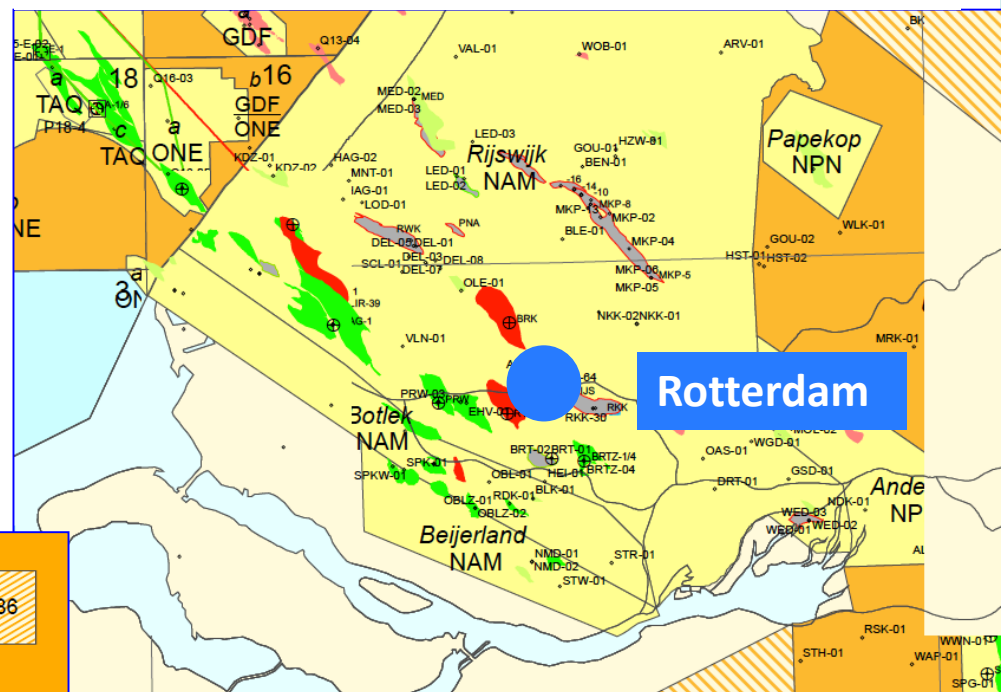


> 500m

Geothermal exploration permits



Oil and Gas fields



also:

*Potential for
CO2 storage,
Shale gas*



Subsurface Balancing 4P's :

Potential for use, but:

complex (Safety, Health, Economics, Environment, Politics)
and its potential is **not unlimited**.

Technical expertise on individual subjects needed and available.

But to avoid delays, costs and to make full use of opportunities the subsurface offers it is necessary to:

- 1. Adapt a holistic view on the subsurface** - develop knowledge of the subsurface as a system.
- 2. Bring in the subsurface as early as possible** into the urban planning process.

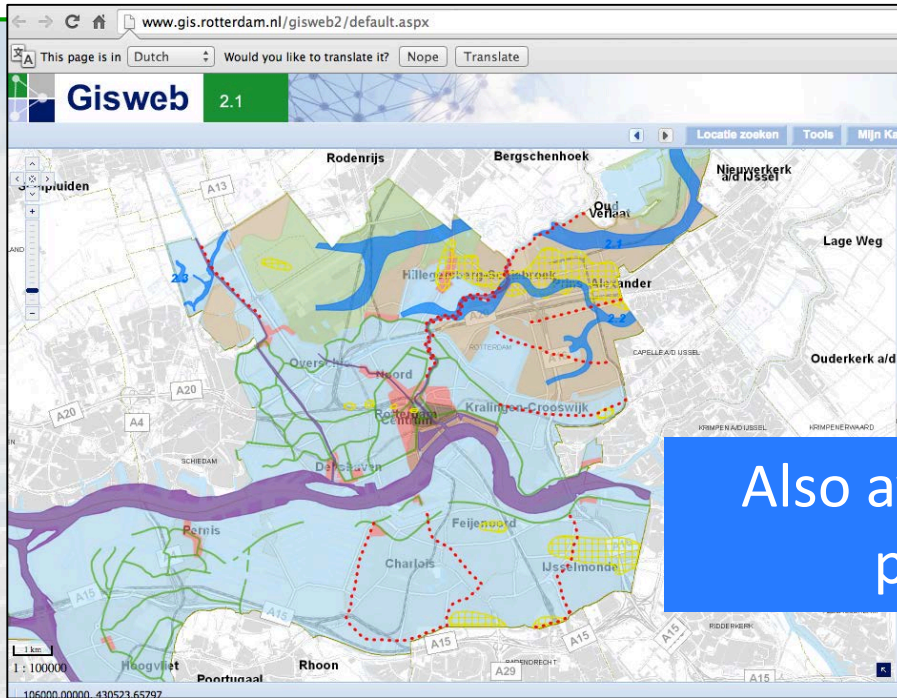


Subsurface Balancing 4P's

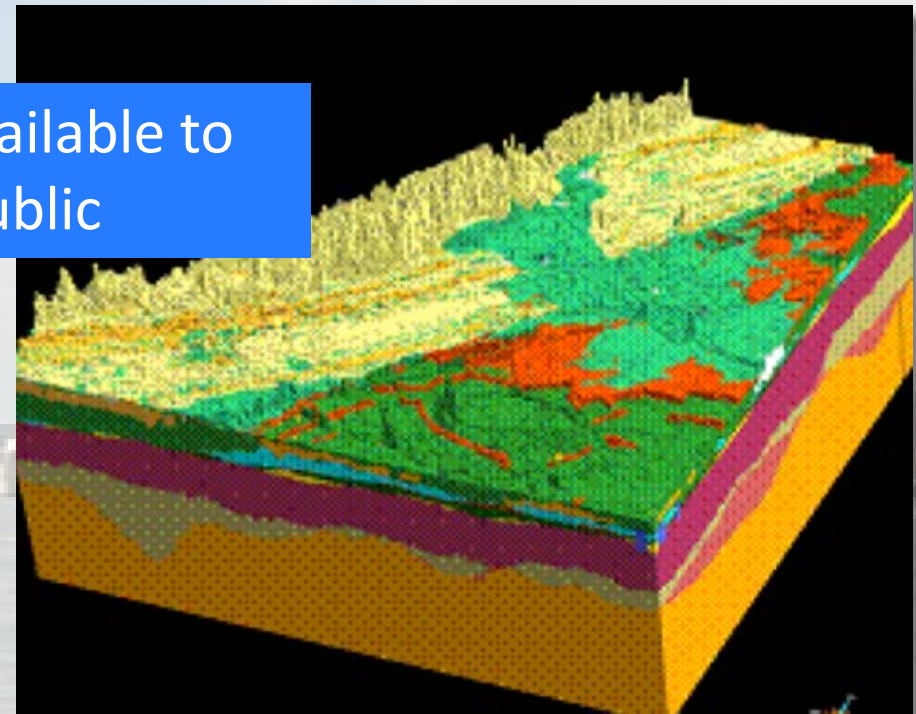
What the city needs



Data available for viewing and analysis with GIS

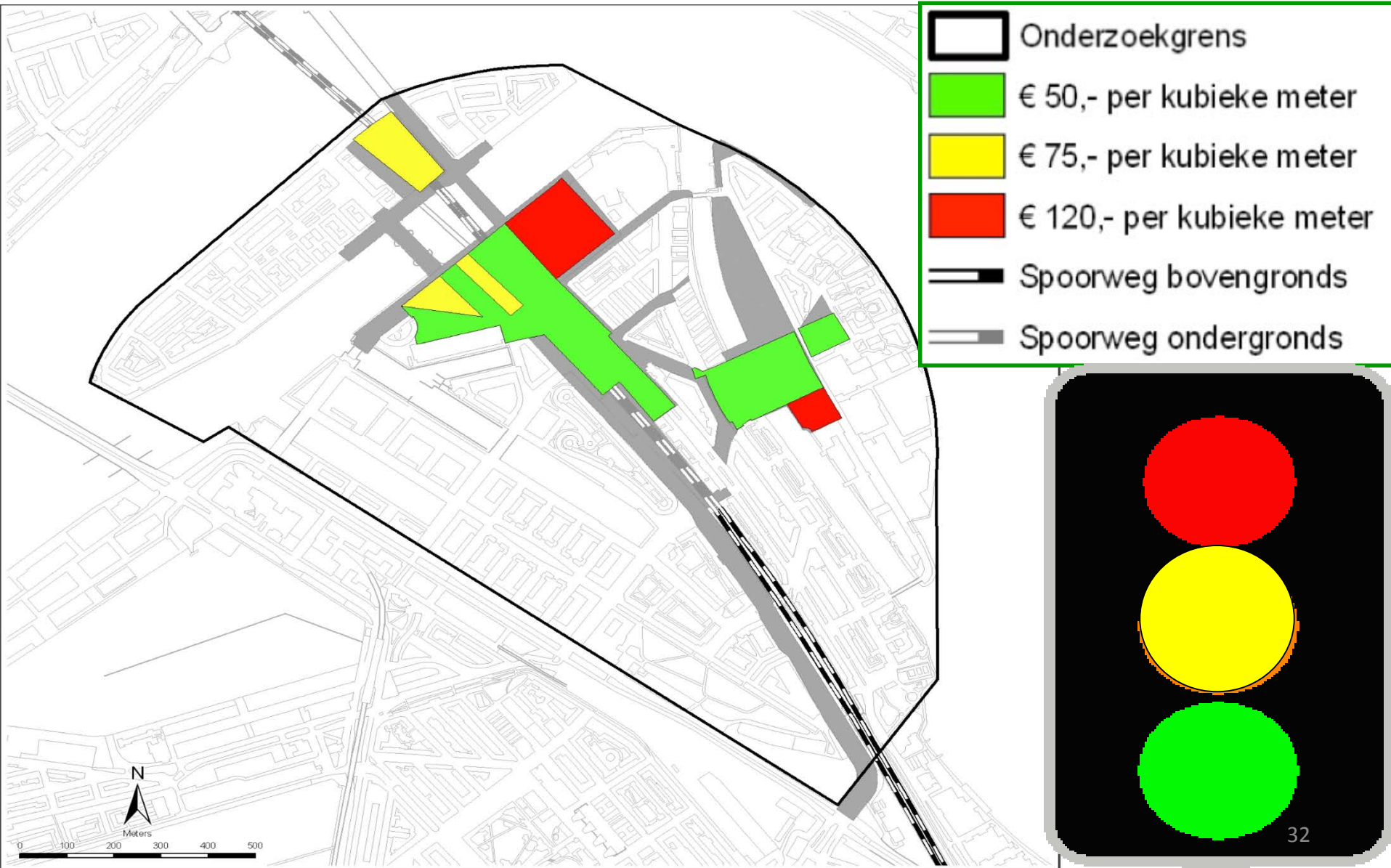


Also available to
public



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Information: Traffic Light legends, showing costs risks, opportunities



Process

In time to
exploit
the
opportunities

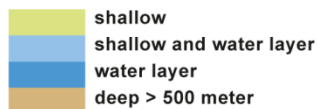
Underground-scan

Spatial development cycle



Earlier in
the process

SUBSURFACE / SUBSOIL	CIVIL CONSTRUCTIONS					ENERGY			WATER			SUBSURFACE						SUBSURFACE / SUBSOIL
LAYERS	archaeology	explosives	underground building	cables and pipes	carrying capacity	ATES (aquifer thermal energy)	geothermal energy	fossile energy resources	water filtering capacity	water storage capacity	drinking water resources	clean soil	subsoil life / crop capacity	geomorphological quality and landscape type	ecological diversity	sand/clay/gravel resources	subsurface storage	LAYERS
PEOPLE																		PEOPLE social structure (neighbourhood typology) social behaviour labour productivity labour capital
METABOLISM																		METABOLISM energy / food water waste air (building) material products
BUILDINGS	Existing constructions.								Deep pollution long term, undeel pollution short term									BUILDINGS offices housing utility culture
PUBLIC SPACE	Cooling water											Bio mass						PUBLIC SPACE living environment culture nature agriculture
INFRA STRUCTURE						Buffering heat from the urban district heating												INFRA STRUCTURE mobility network
SUBSURFACE																		SUBSURFACE subsurface subsoil water energy civil constructions
SUBSURFACE	CIVIL CONSTRUCTIONS					ENERGY			WATER			SUBSURFACE						SUBSURFACE



System exploration (SEES)

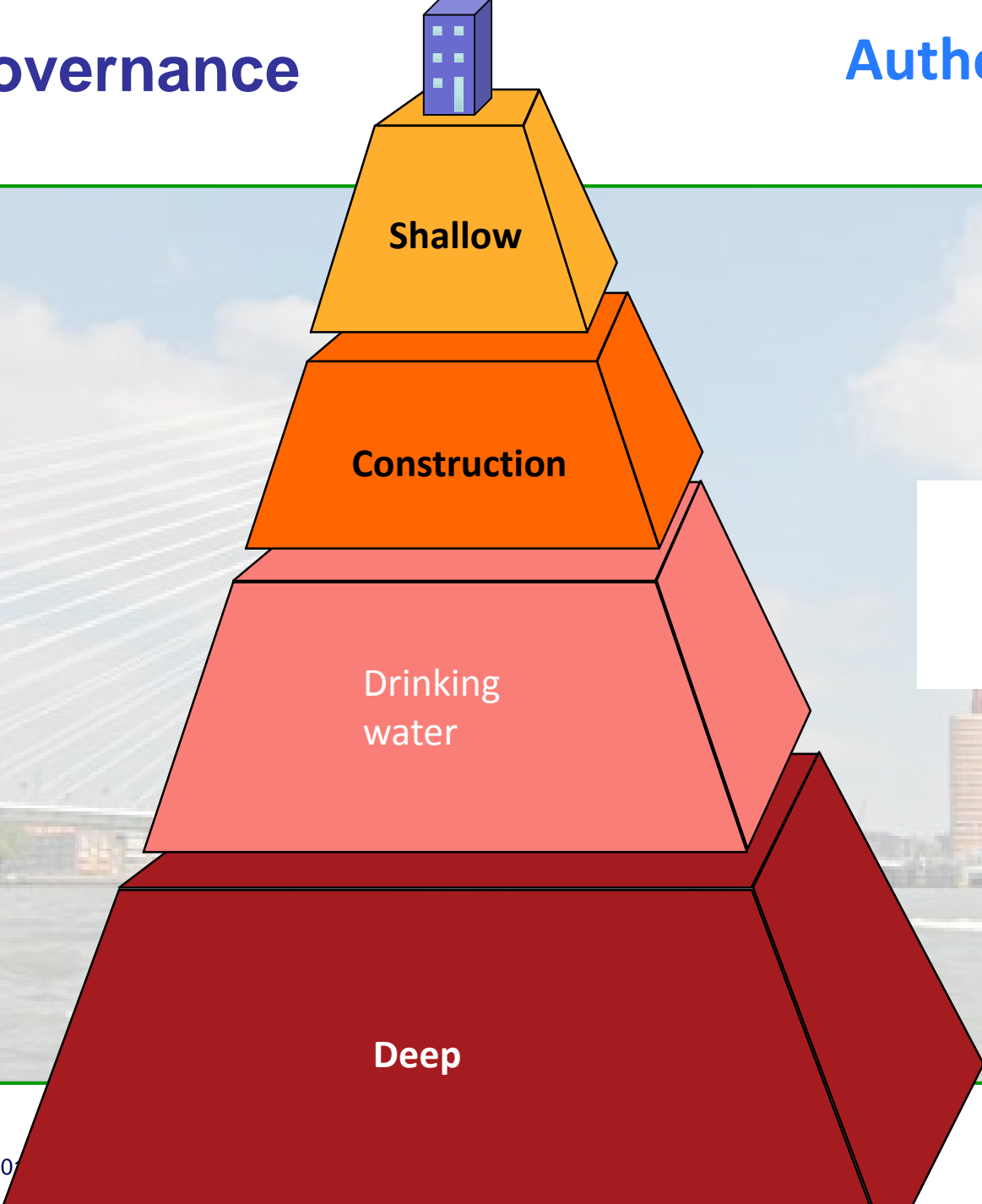
Training

Workshops for students of
Urban Planning Faculty
TU Delft

*.....once a year, a week, working on our
subsurface data, lectures from subsurface
specialists.....from 30.....100 students*

Governance

Authorities



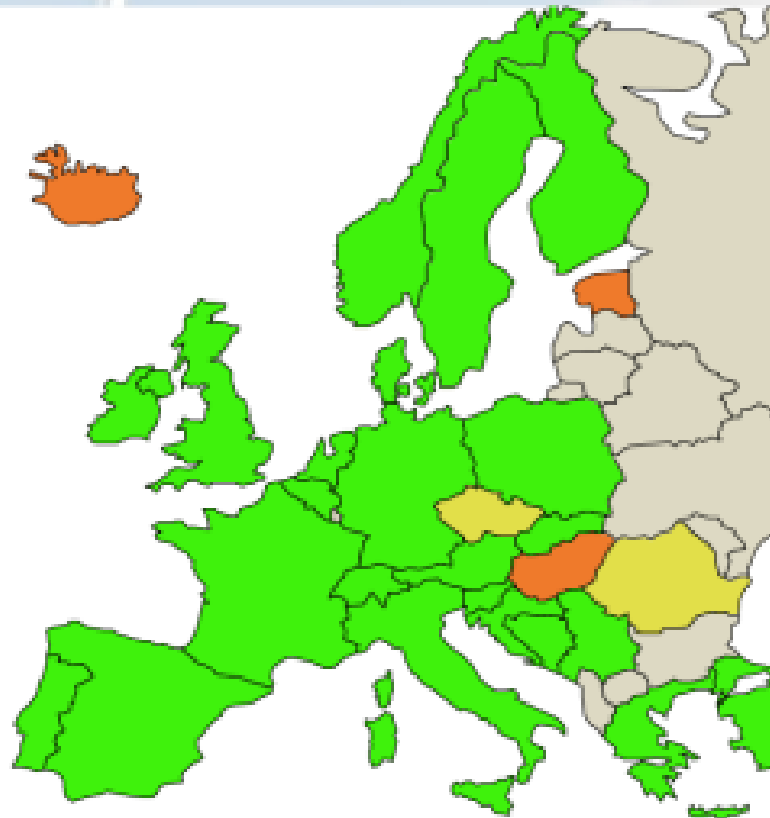
Water boards

Municipalities

Provincial Authorities

National Government

SUB-URBAN - A European network to improve understanding and use of the ground beneath our cities



27
countries

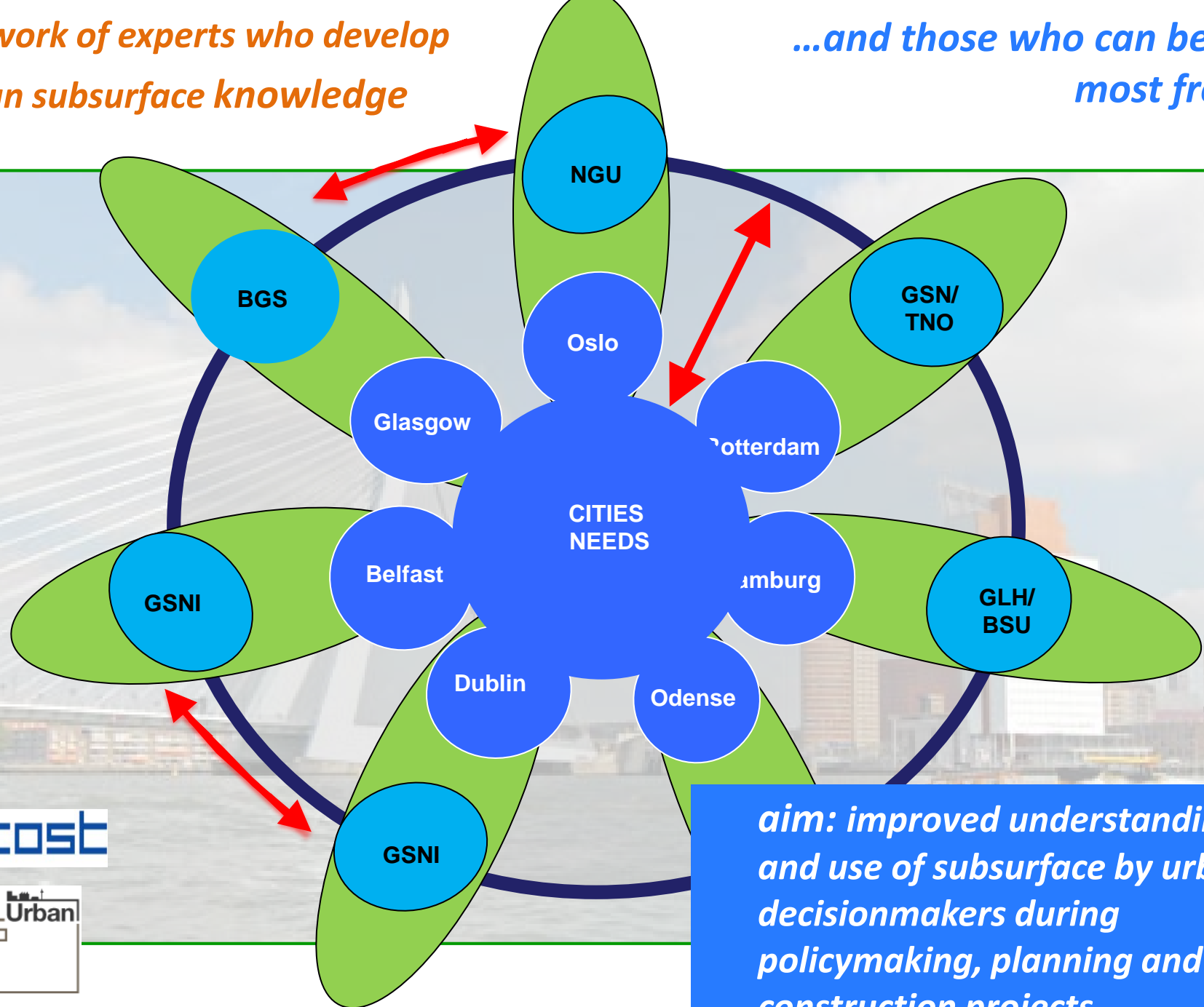
2015 – 2017....



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 *Network of experts who develop
urban subsurface knowledge*

*...and those who can benefit
most from it*



*aim: improved understanding
and use of subsurface by urban
decisionmakers during
policymaking, planning and
construction projects.*





Balance 4P project

SNOWMAN NETWORK

Knowledge for sustainable soils

Project No. SN-04/01

BALANCE 4P

BALANCE 4P: Balancing decisions for urban brownfield regeneration – people, planet, profit and processes

Workpackage 5

Harmonizing subsoil management in spatial planning: the Netherlands, Sweden and Flanders.

Start date of project: 01.10.2014 **Project duration:** 15 months

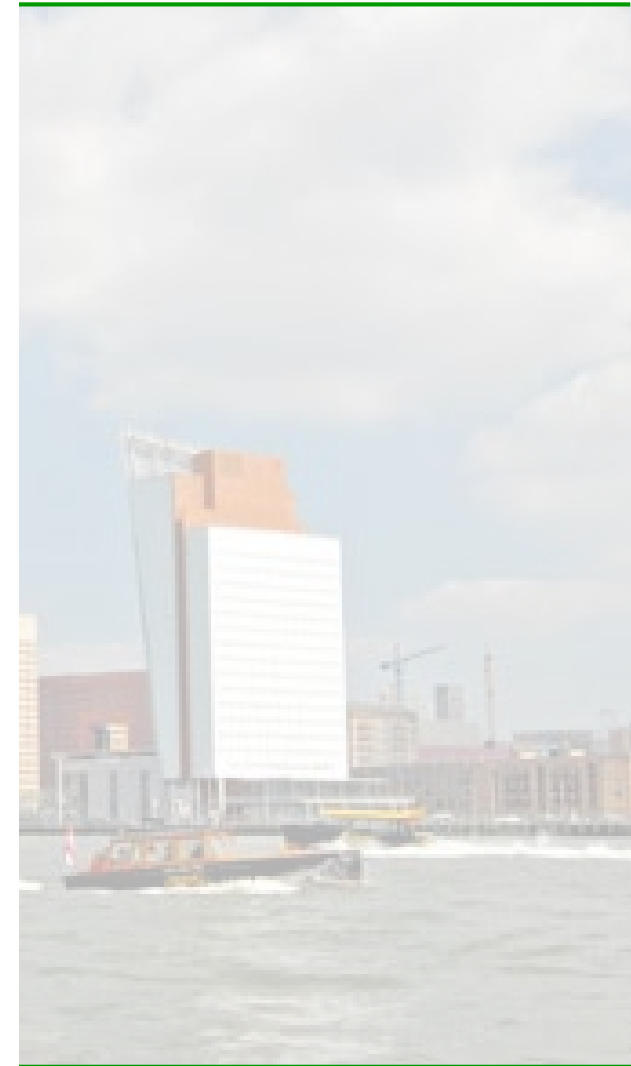
End date of project: 31.12.2014

Date of report : 14.02.2015

Authors: Fransje Hooimeijer (TUDelft), Lidewij Tummer (TUDelft)



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Results implementing 4p's by urban planning students TUDelft

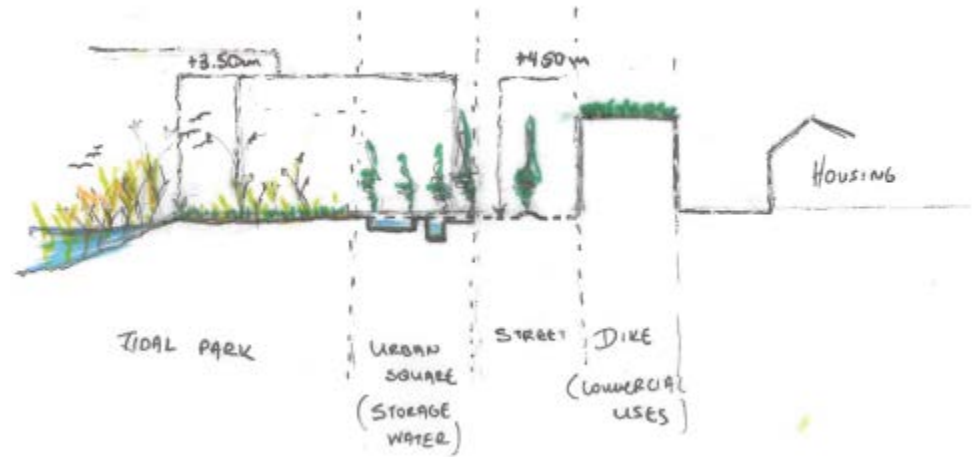
Categories:

- Connectivity
- Climate change
- Efficient use of space
- Green cities
- Health and liveability
- Resource efficiency
- Strong and resilient society
- Sustainable energy
- Sustainable food production



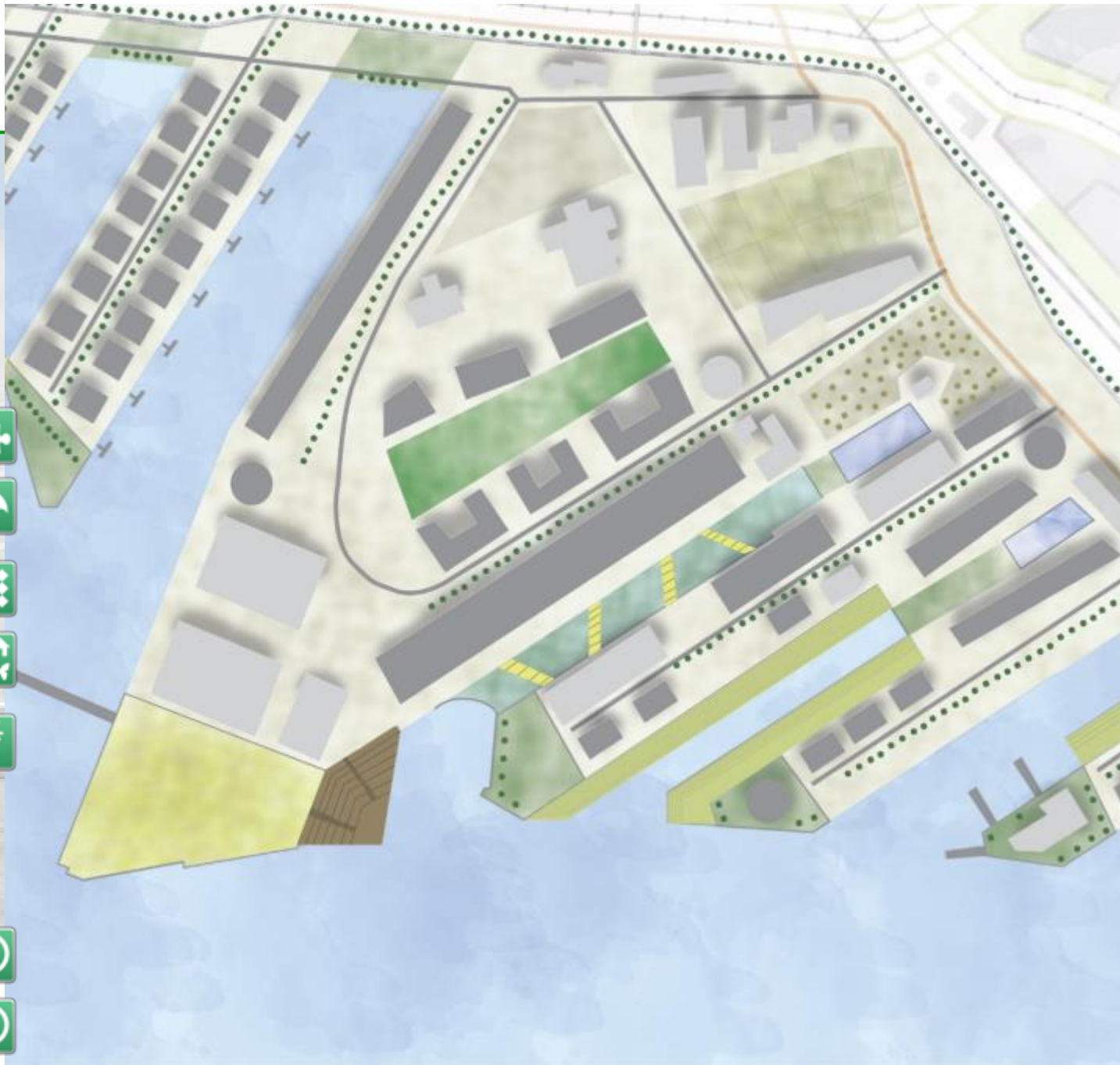
ANALYSIS

location analysis - green



Crossing Fingers - Merwe-Vierhaven - Sebastiaan Huls - AR0021 Aqua Terra Urban Design

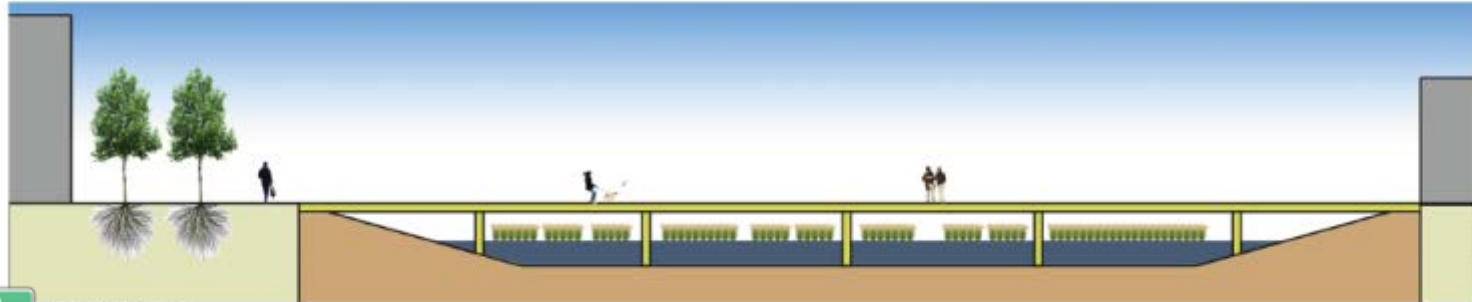
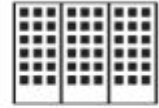






DESIGN

sections



 Section 3: Wetland



Section 4: Energy park



Section 5: Waterfront

Crossing Fingers - Merwe-Vierhaven - Sebastiaan Huls - AR0021 Aqua Terra Urban Design



Floating and hanging weeds



Drijvende rietmoerassen, pilot Houtribsluizen Markermeer (Bron: Deltares)



Student Workshop

Balance4p TUD

EXISTING



CABLES AT THE BORDERS, PARK IN THE MIDDLE

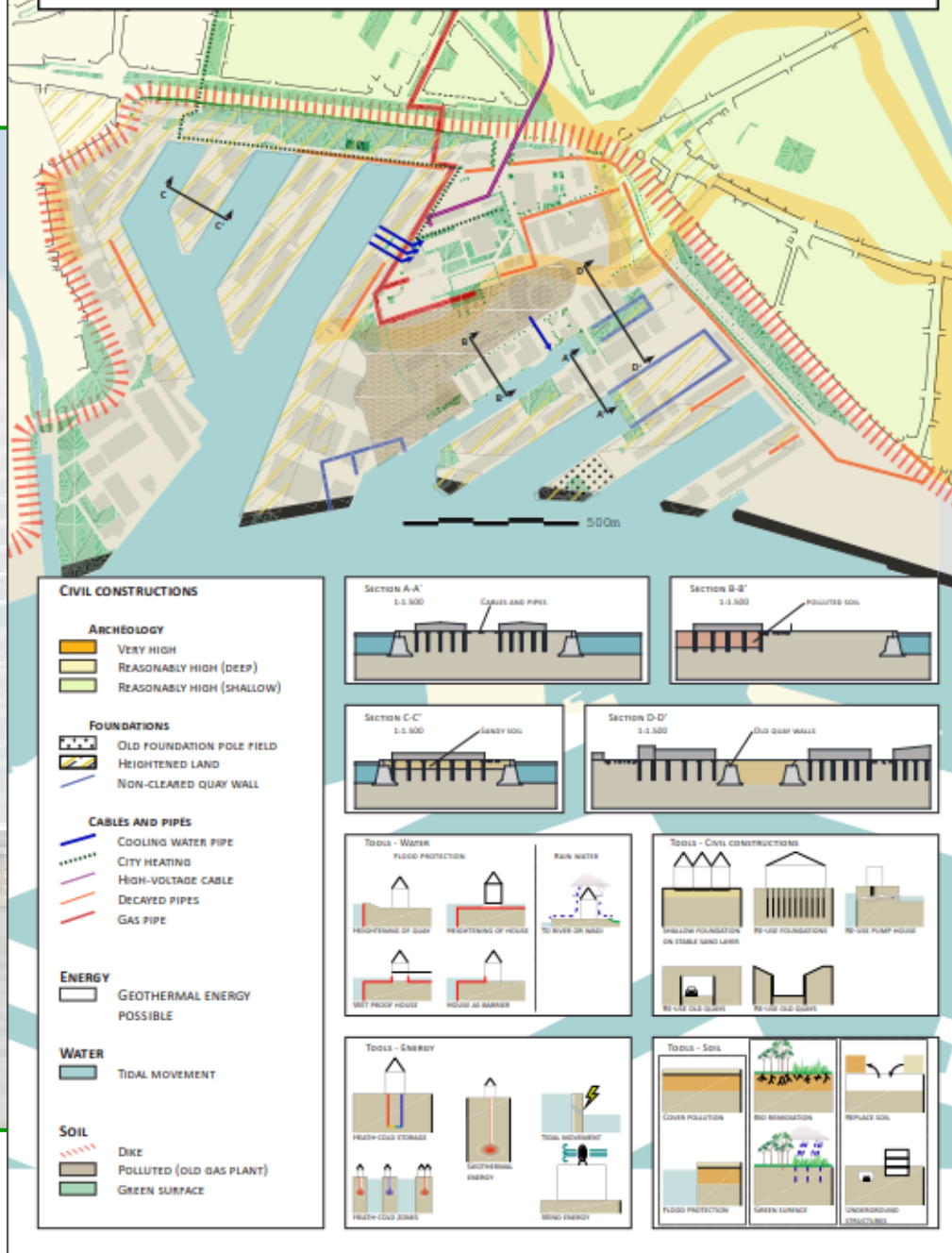


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M4H SUBSOIL CHARACTERISTICS & TOOLS

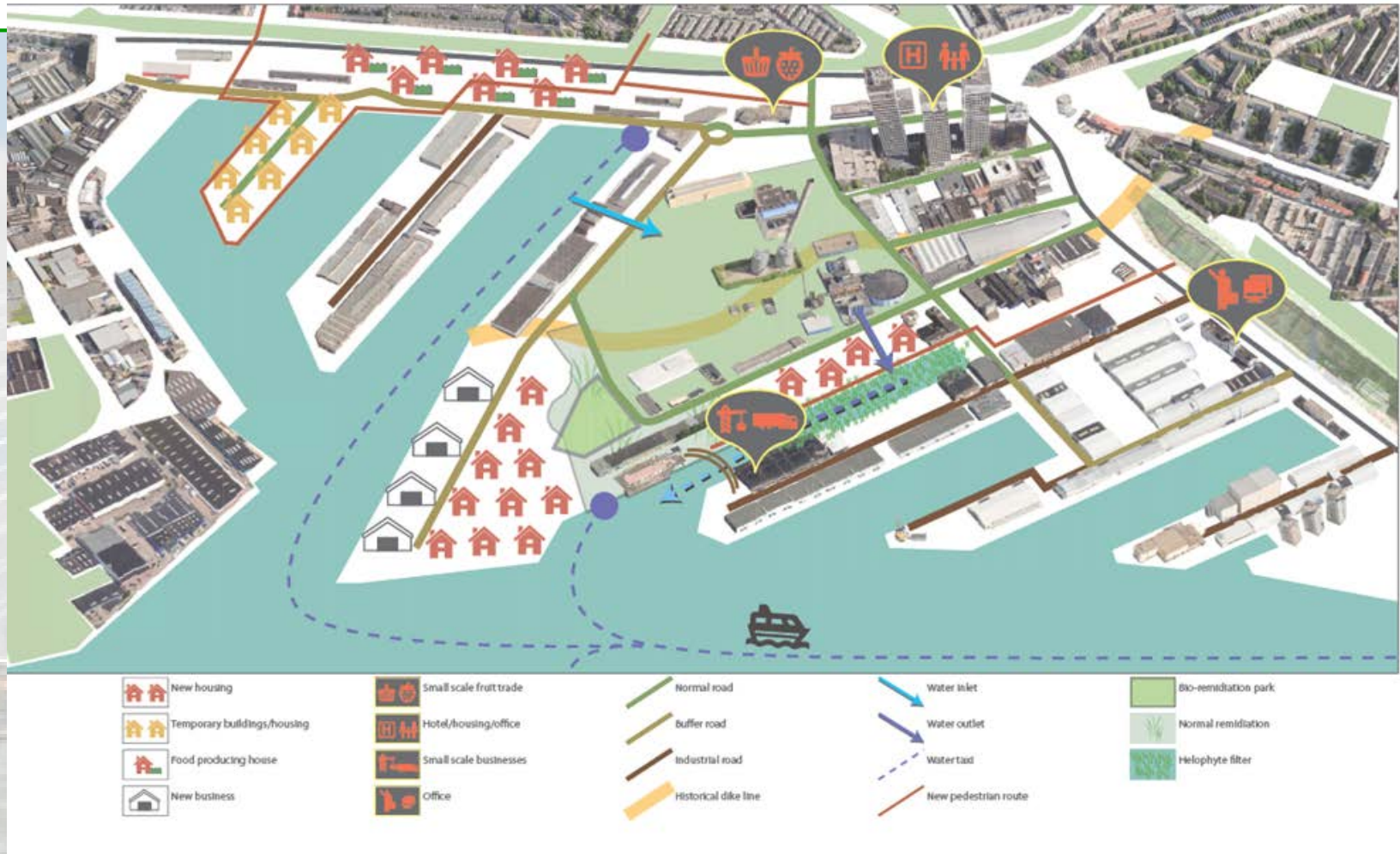
Sanne Mooij
Student TUD

Analysis of subsurface topics in M4H



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Results by student Sanne Mooij (TUD)



Conclusions balancing 4P's

- It takes time to get all stakeholders involved
- It takes energy to bridge the gap between different cultures
- It is a new approach that is well handled by students (also in Poland and Romania)
- In Rotterdam more projects make use of the method
- This method can be helpful to serve new legislation (integrating living environment)



A slow road to awareness



- We have to start as early as possible in the process



Thank you



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