Brand new Delft doublet with promising scientific future

Phil Vardon, Hemmo A. Abels, Auke Barnhoorn, Alexandros Daniilidis, David Bruhn, Guy Drijkoningen, Kaylee Elliott, Beer van Esser, Susanne Laumann, Piet van Paassen, Liliana Vargas Meleza, Andrea G. Vondrak and Denis Voskov

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GEAN - Stavanger
13 March 2024

Introduction

Current situation in the Netherlands:

- ~40 geothermal doublets
- Horticulture (greenhouses)
- Direct-use geothermal

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Geothermal energy ambition
- 50 PJ in 2030
- 200+ PJ in 2050

	2018	2025	2030	2050
Number of doublets (#)	17 1-2 new per year	75 10 new per year	175 20 new per year	700 25 new per year
Number of buildings connected to a district heating grid	0	140k	570k	3.8m
Above-ground space required (ha)	10	50	110	450

Masterplan Aardwarmte, 2018

- Great urban geothermal ambitions

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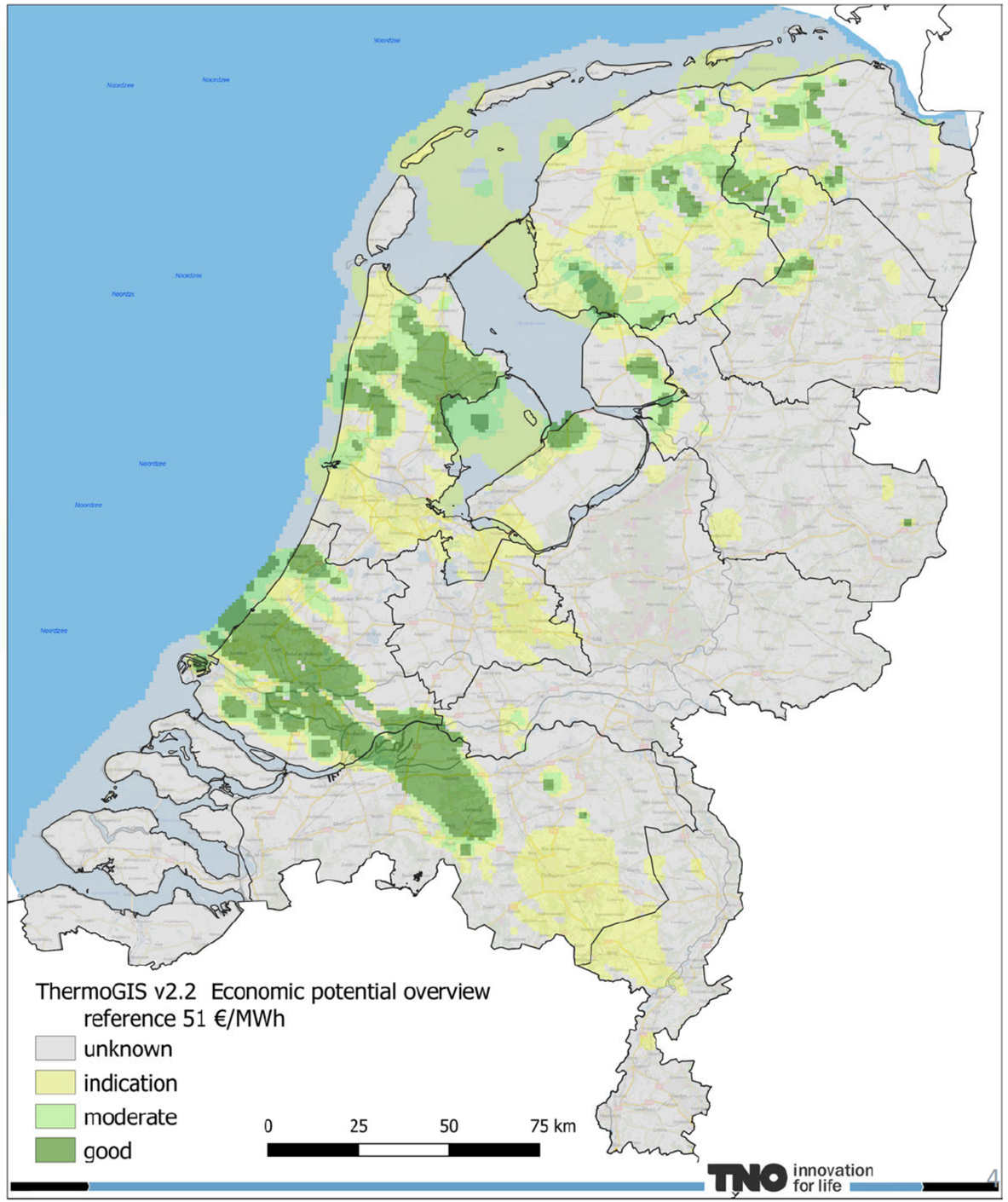

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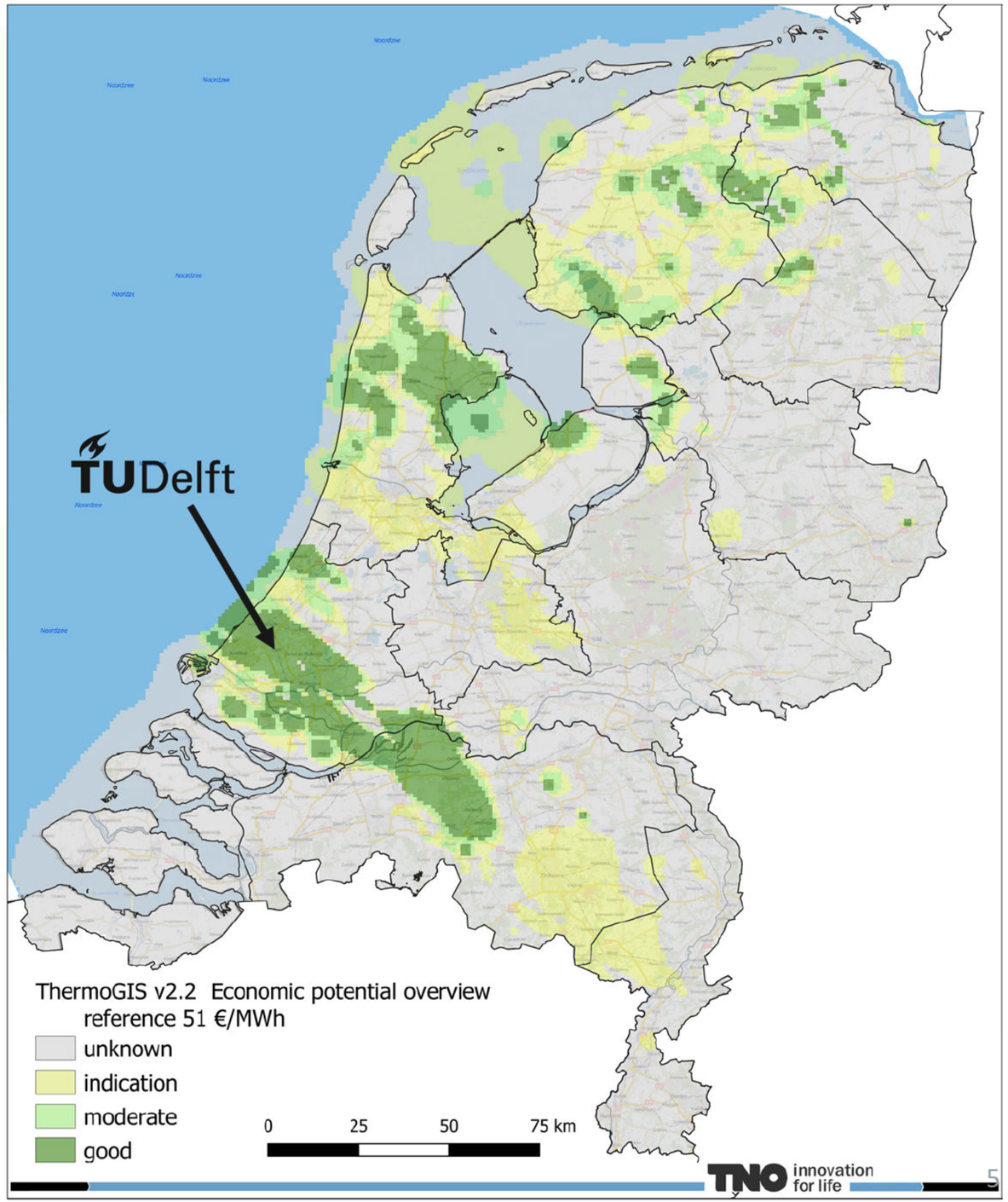

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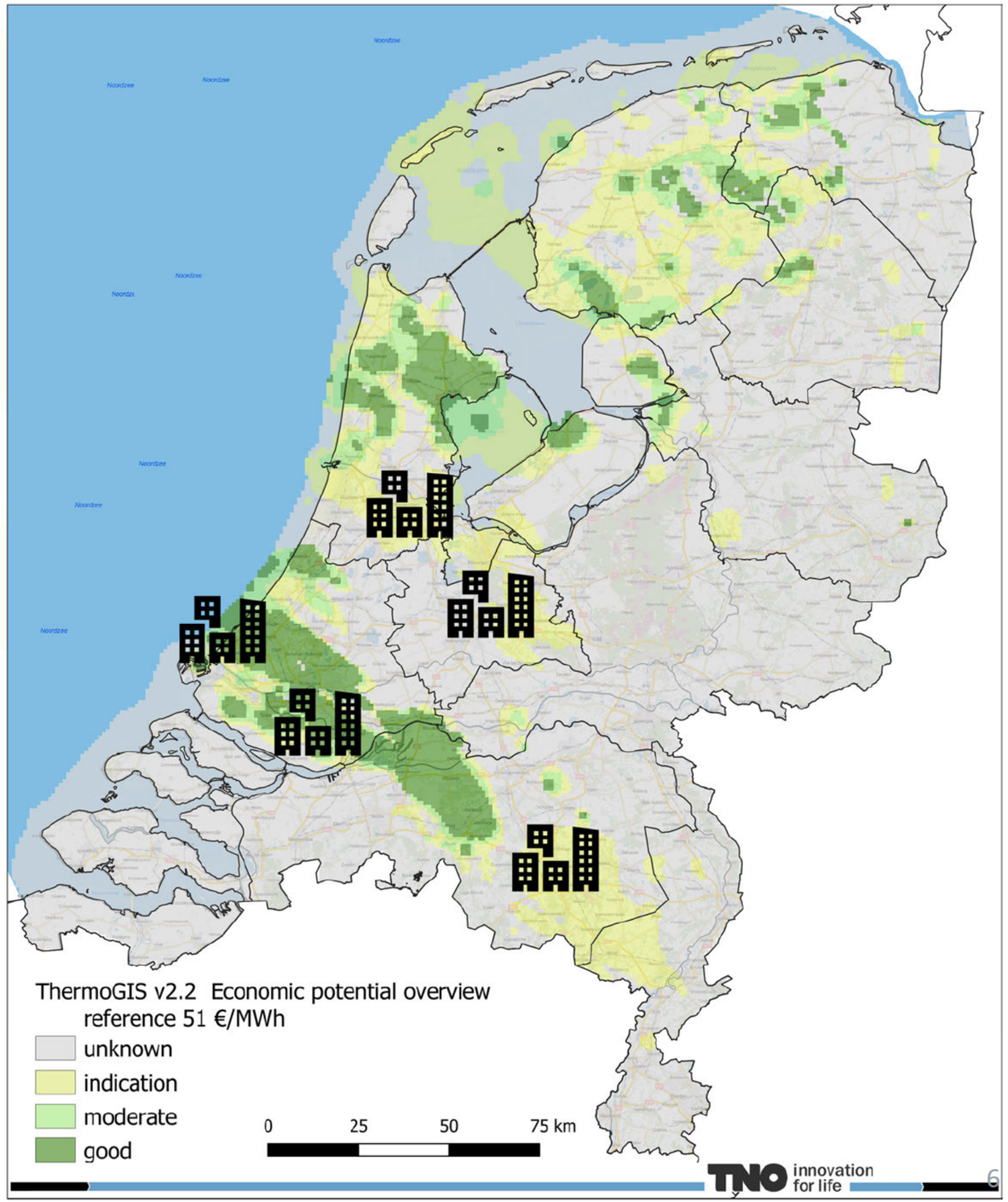
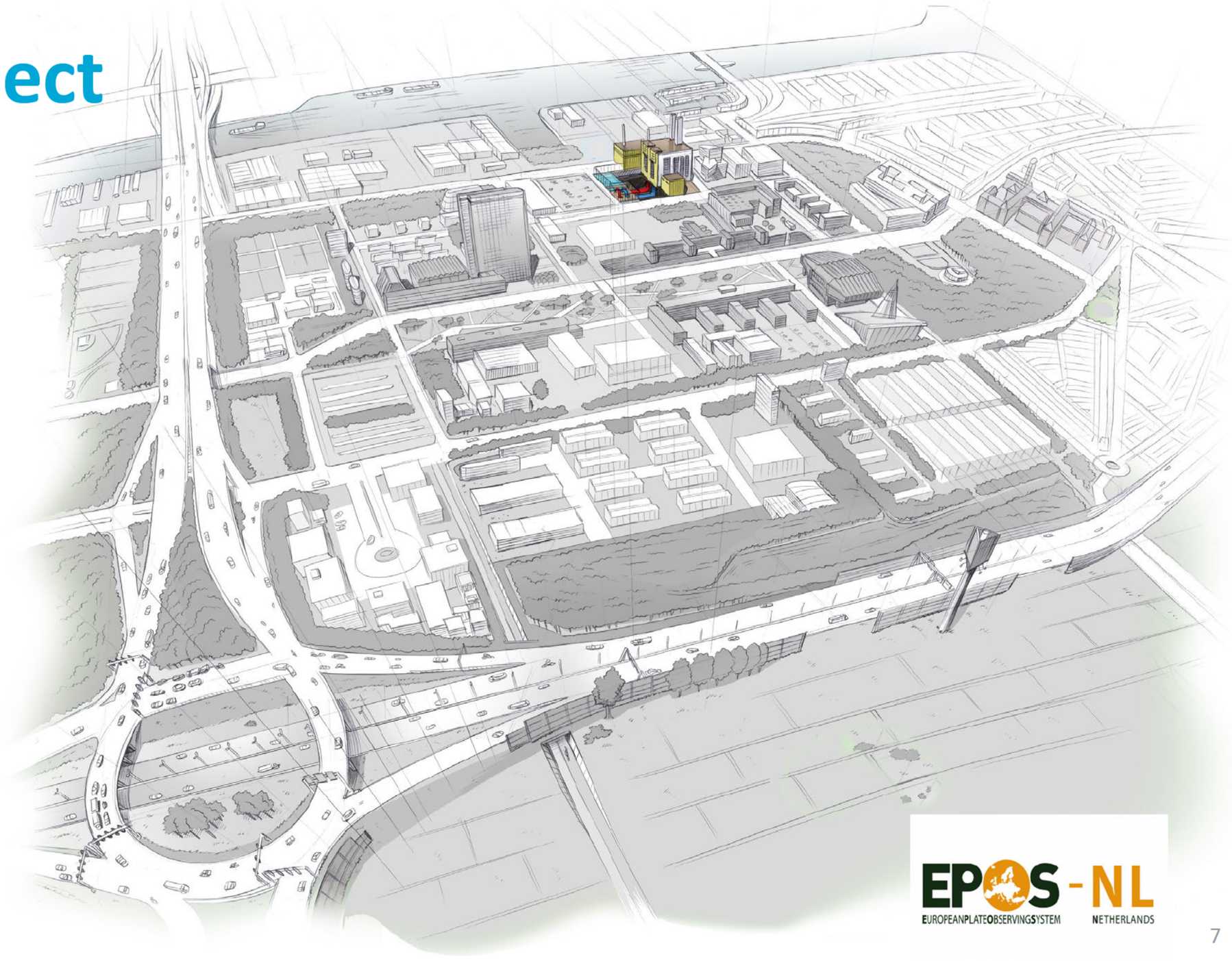


Campus project

One project, two goals

Energy
Knowledge



Campus project

One project, two goals

Energy
Knowledge

GEOTHERMIE DELFT
Delftse bron van duurzame energie en kennis

Aardyn
Geothermie ontwikkeling & beheer

ebn

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Campus project

1) Monitoring stations

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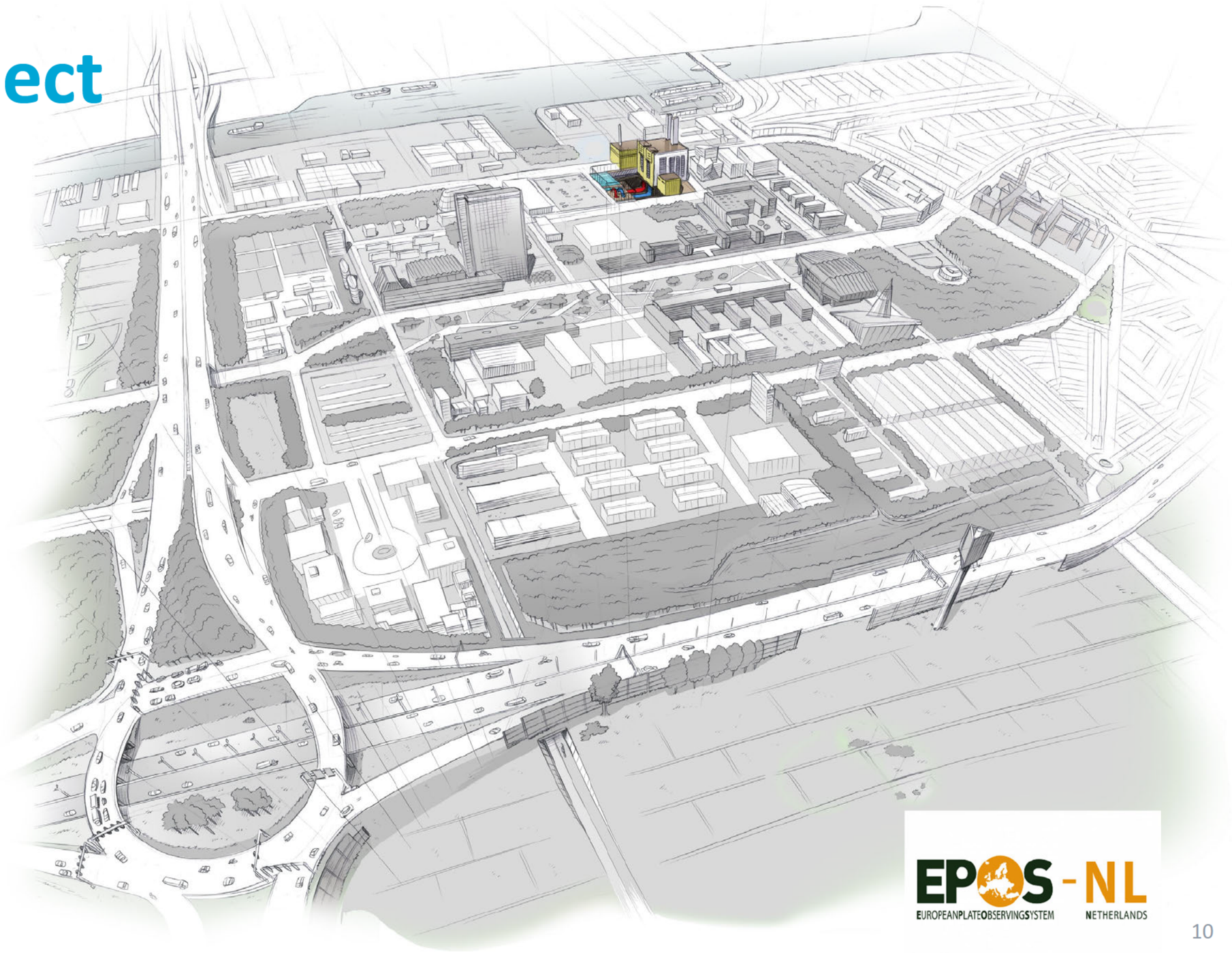
Campus project

1) Monitoring stations ✓



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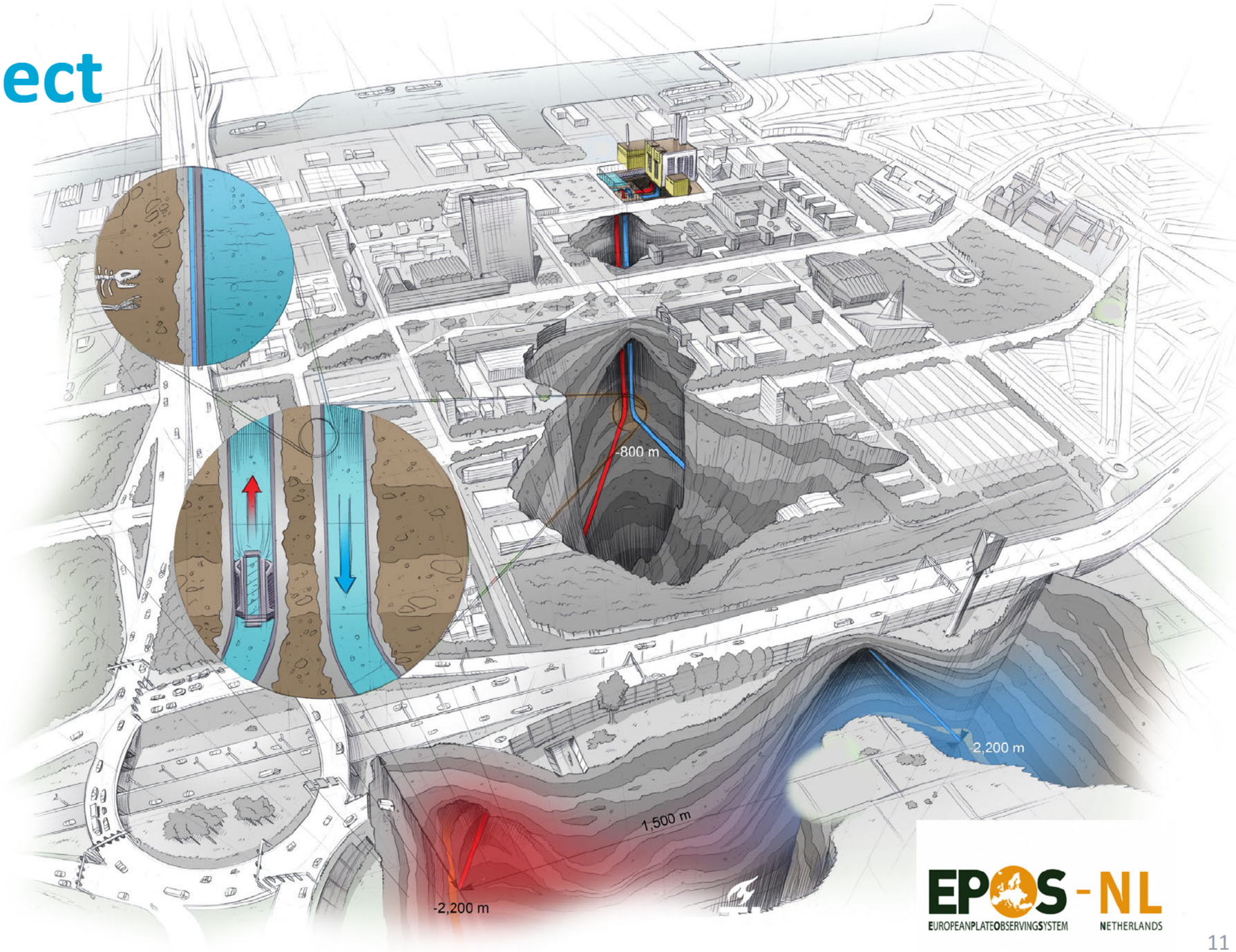
Campus project

1) Monitoring stations ✓
2) Geothermal doublet



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Campus project

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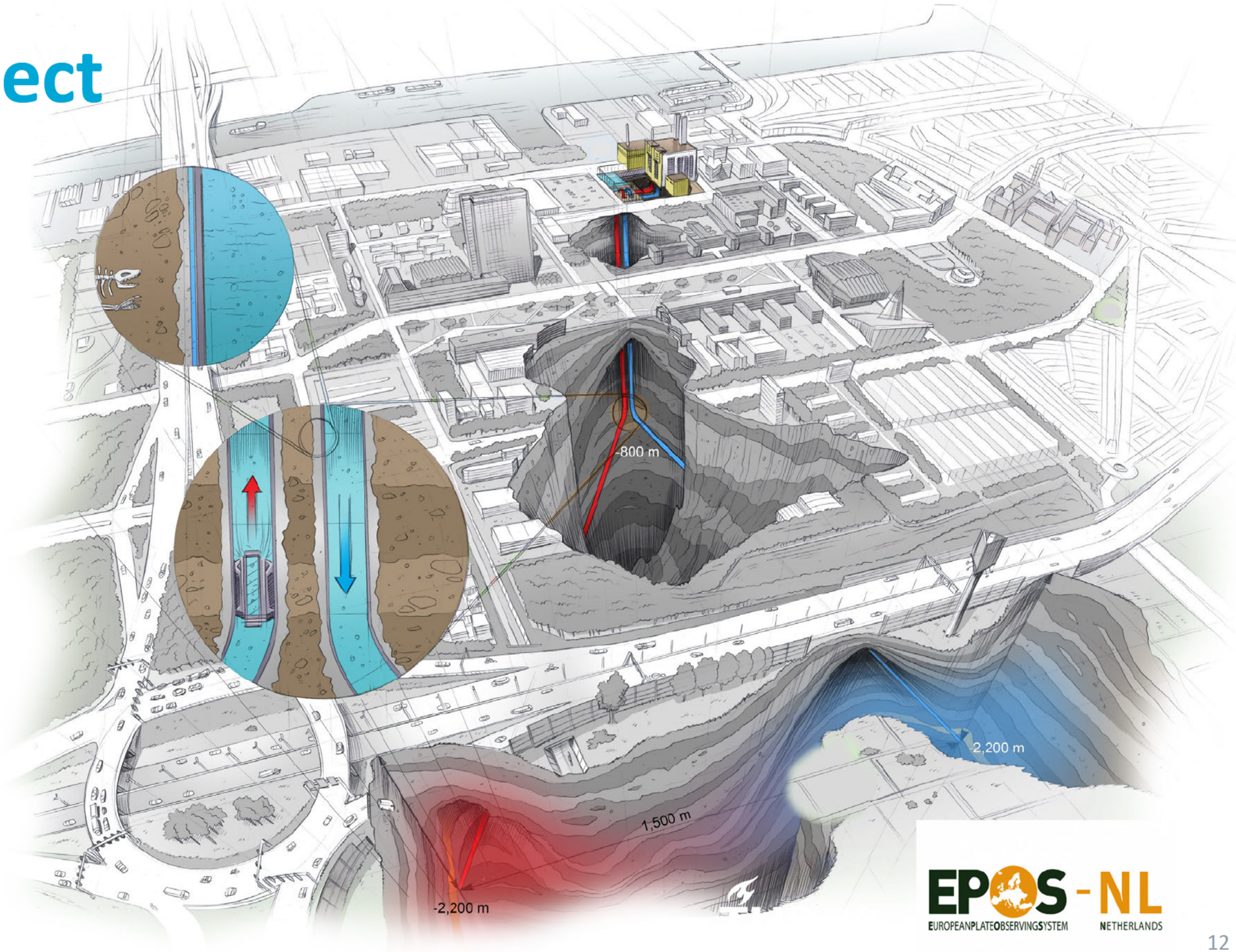

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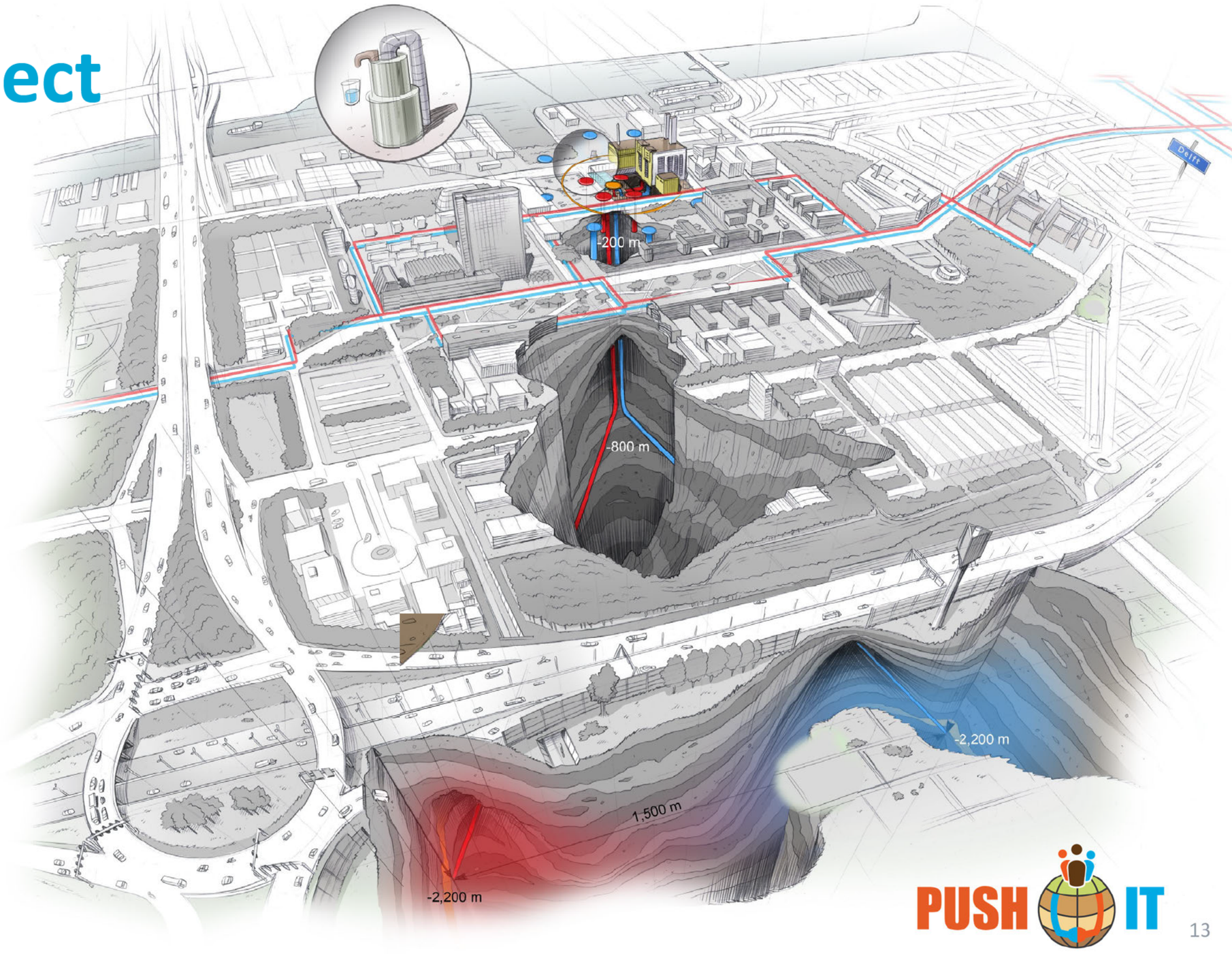
Campus project

1) Monitoring stations ✓
2) Geothermal doublet ✓
3) Seasonal storage



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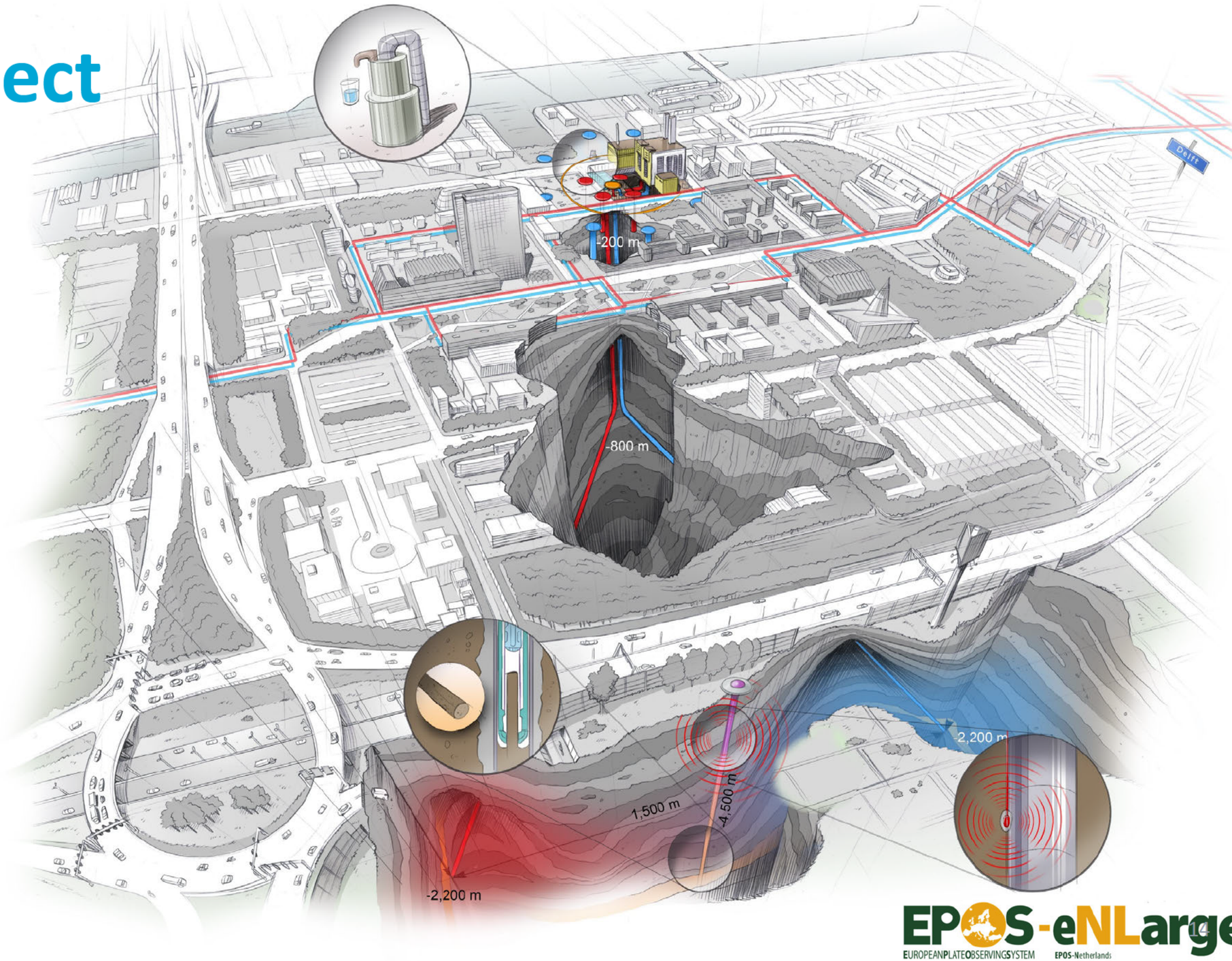
PUSH IT

Campus project

1) Monitoring stations ✓
2) Geothermal doublet ✓
3) Seasonal storage
4) Deep monitoring borehole



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Campus project

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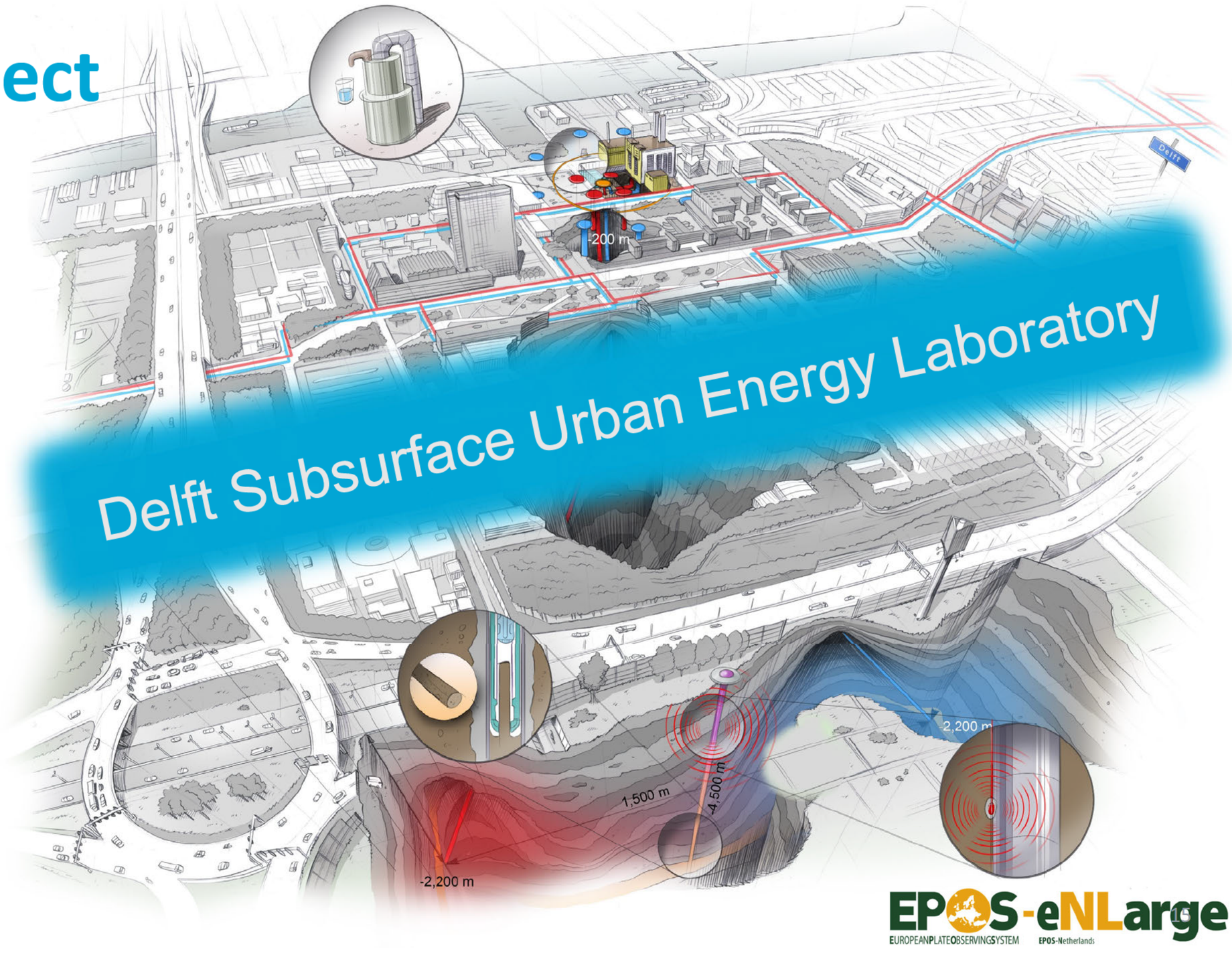
GEAN – Stavanger – 13th March 2024



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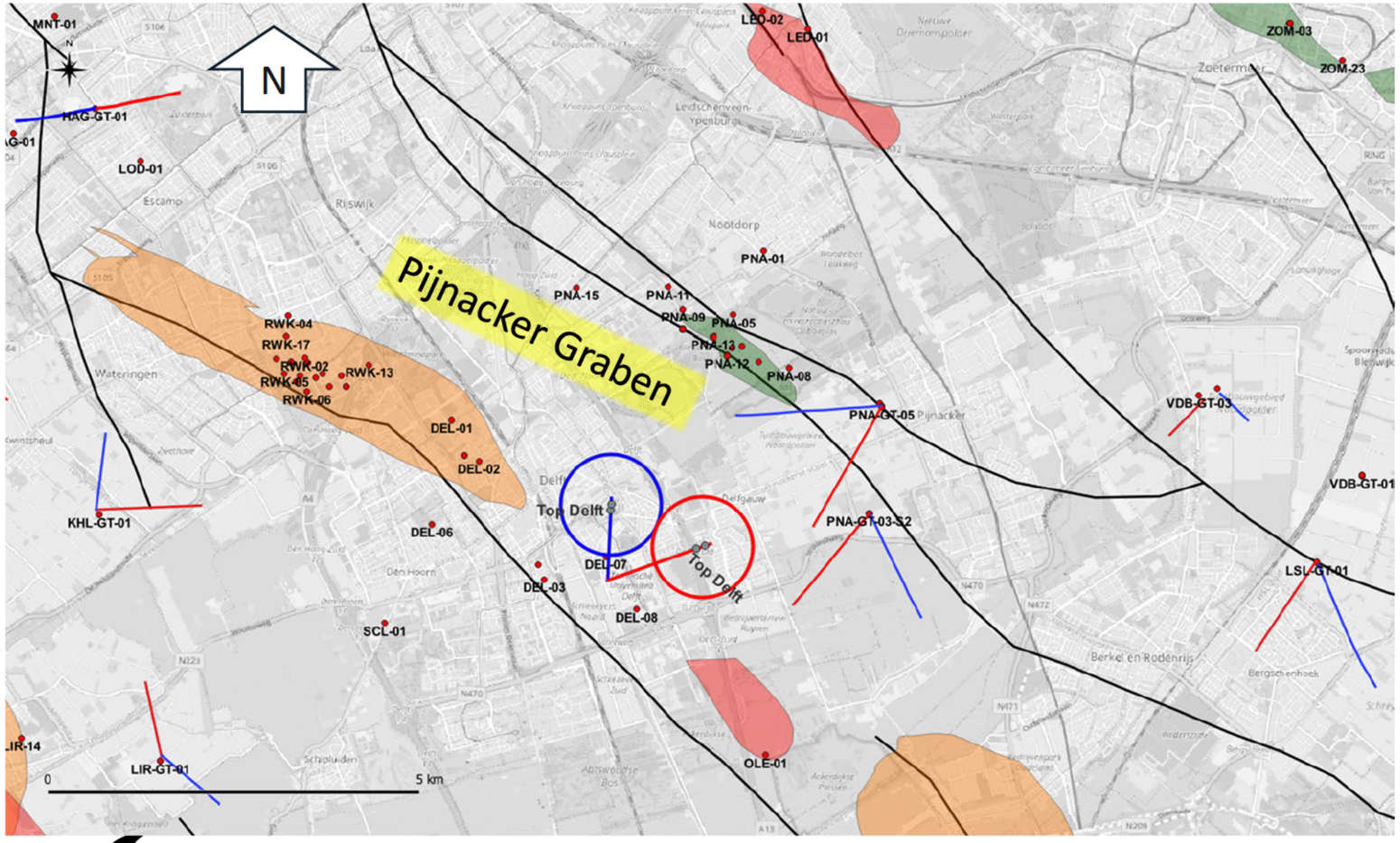
Geological setting



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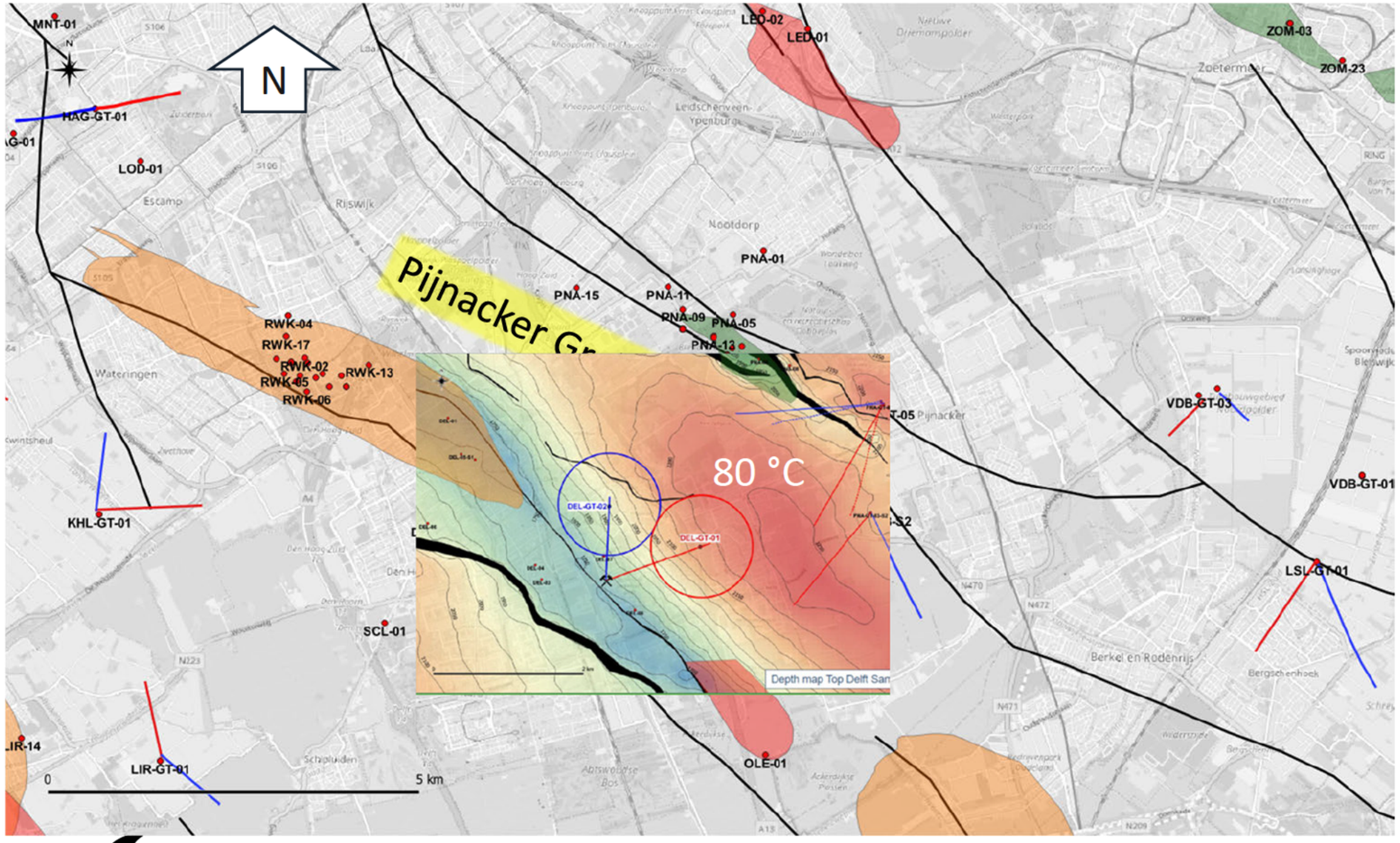
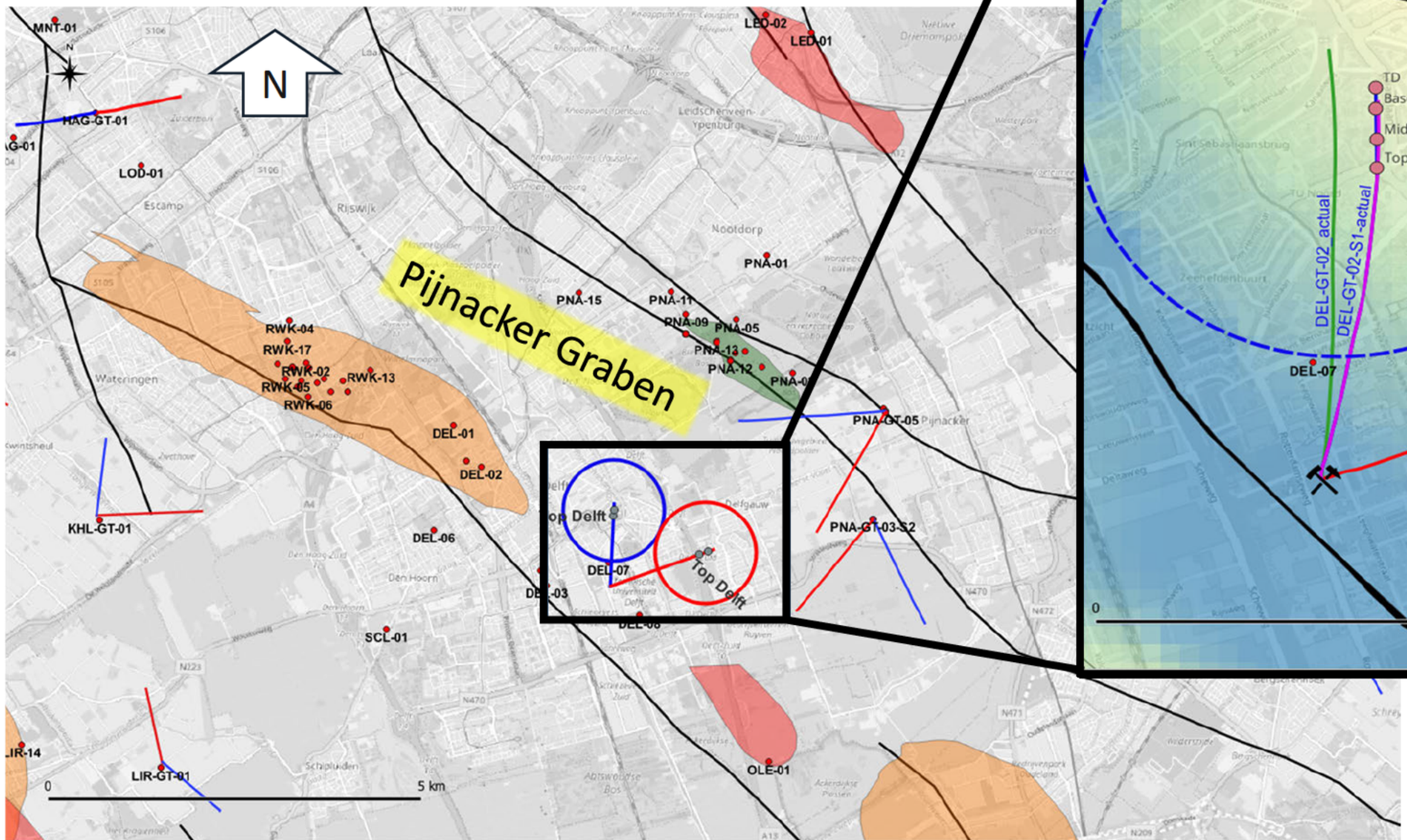


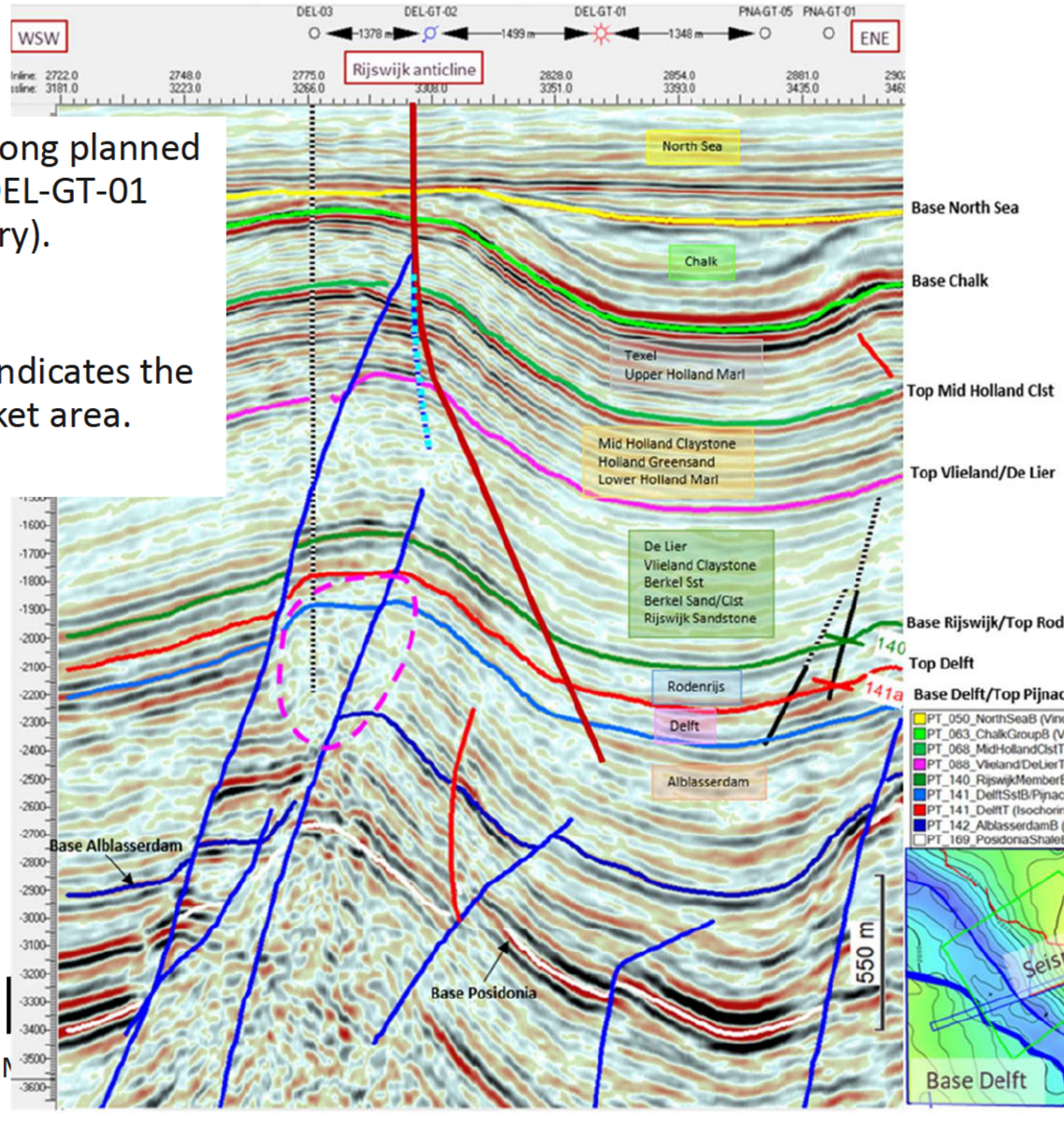
Geological setting

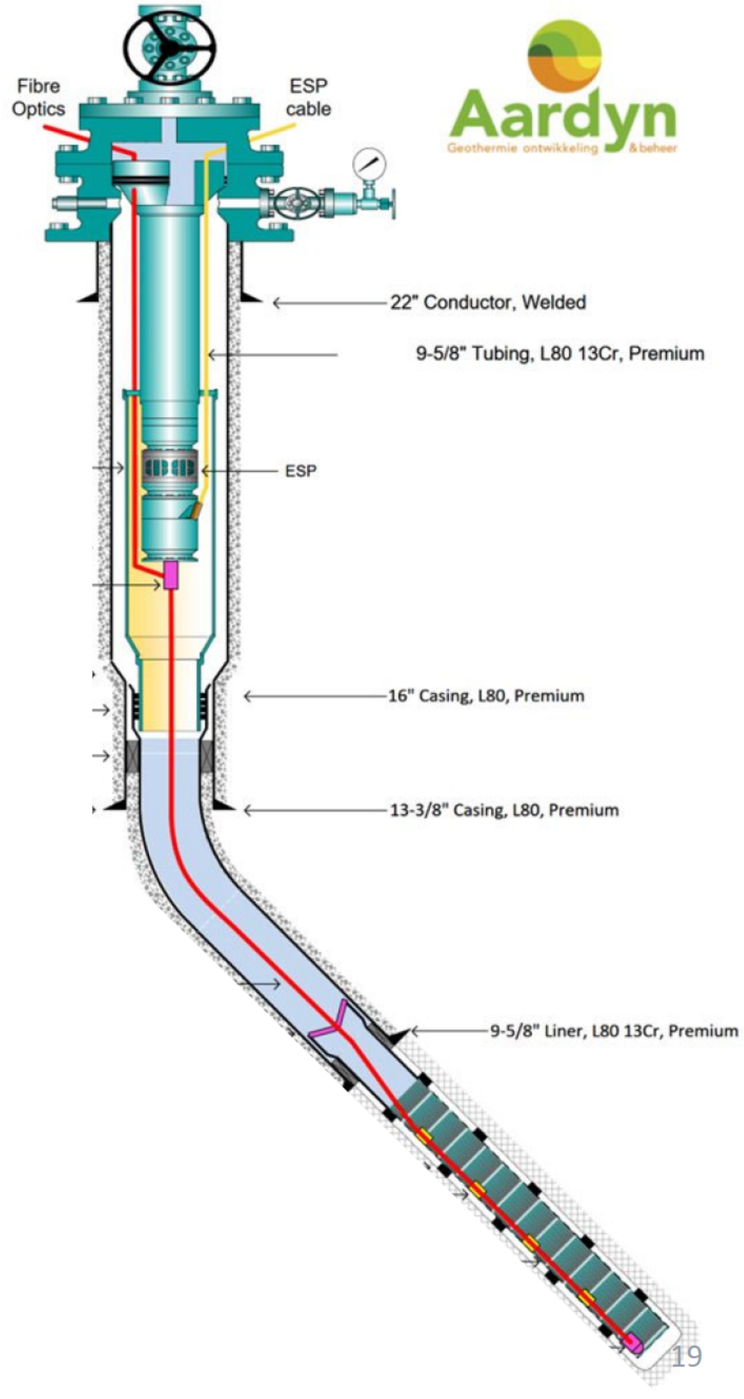


Production well DEL-GT-01

Seismic section along planned production well DEL-GT-01 (dark red trajectory).

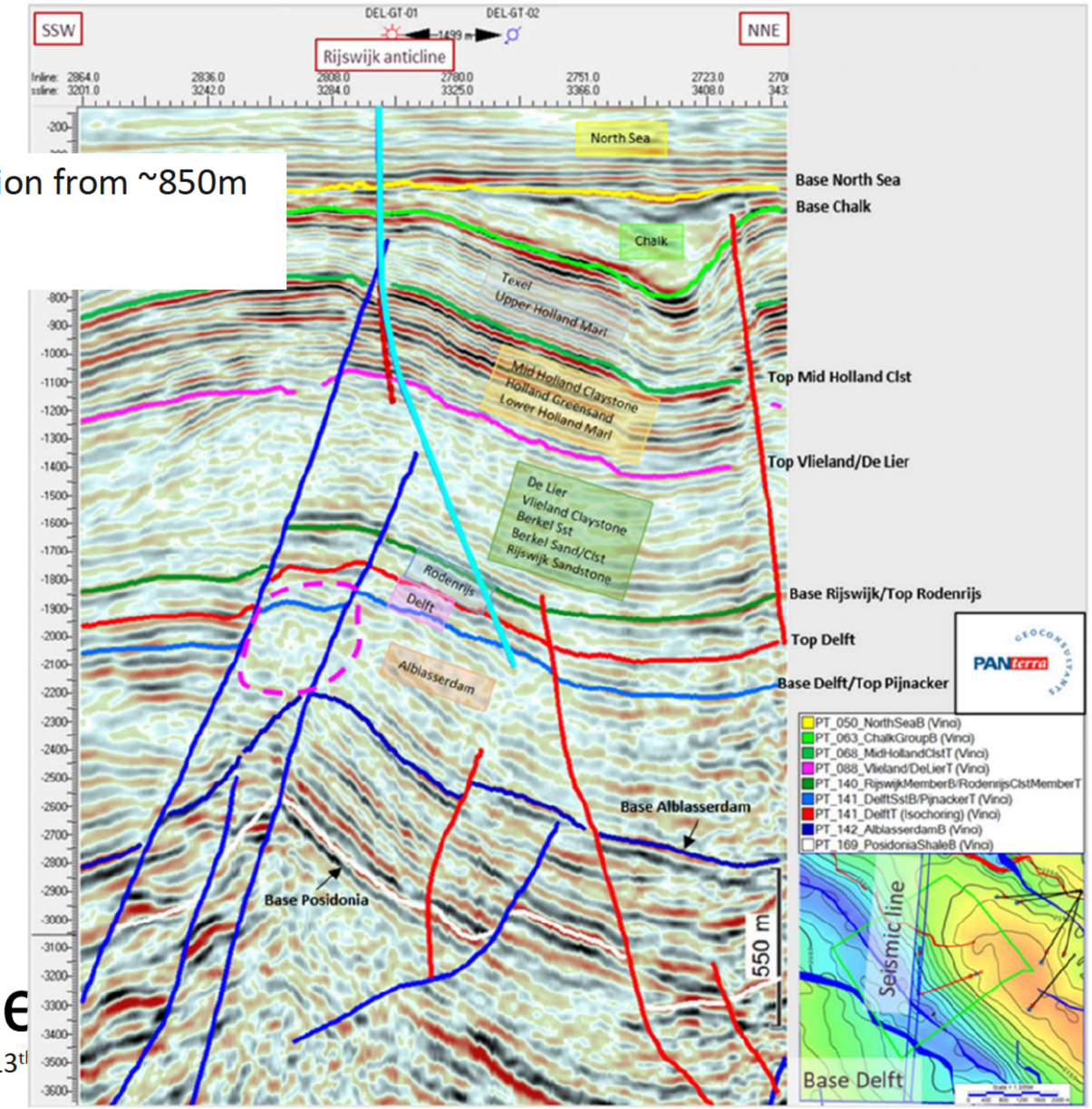
Pink dashed line indicates the potential gas pocket area.

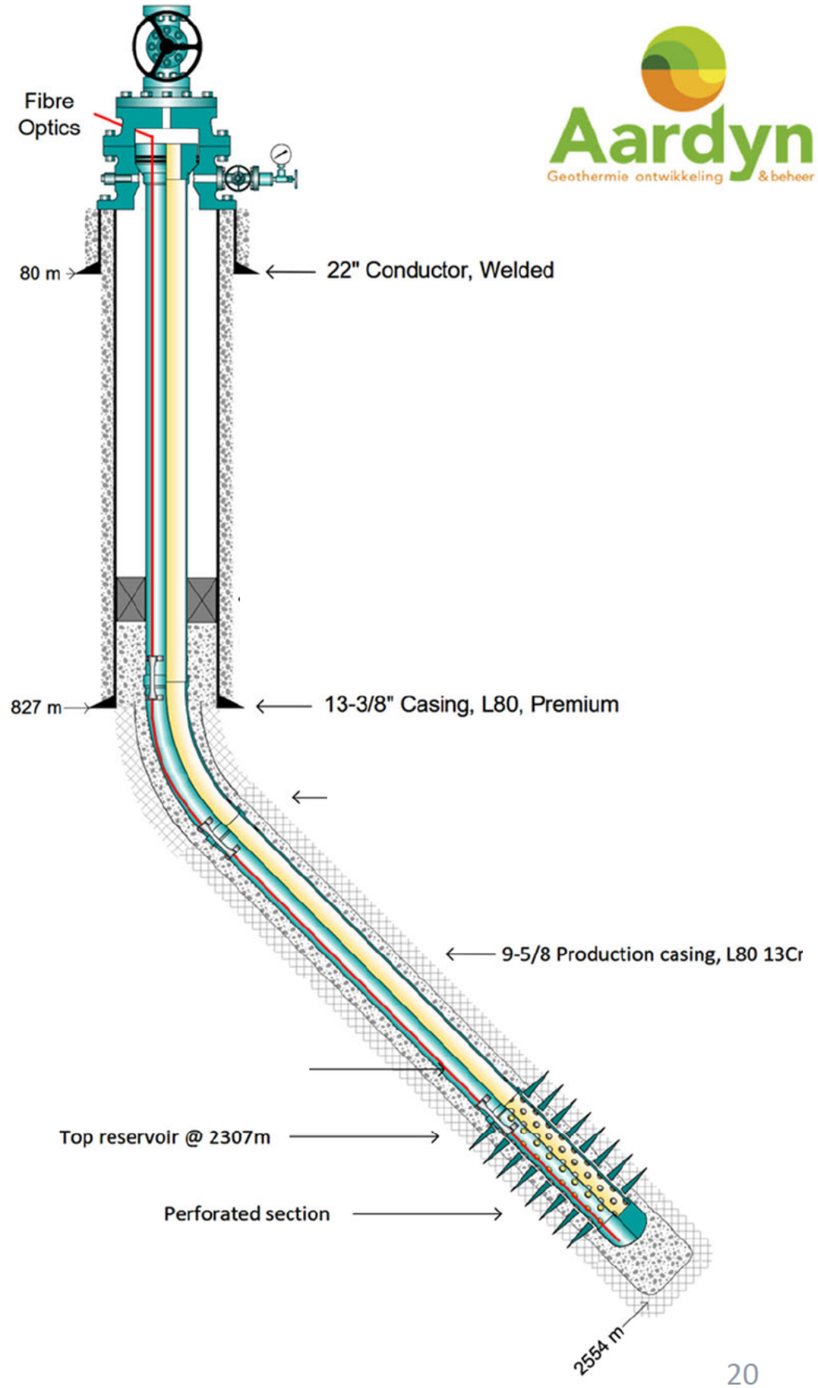




Injection well DEL-GT-02

One single section from ~850m to the TD





Drilling

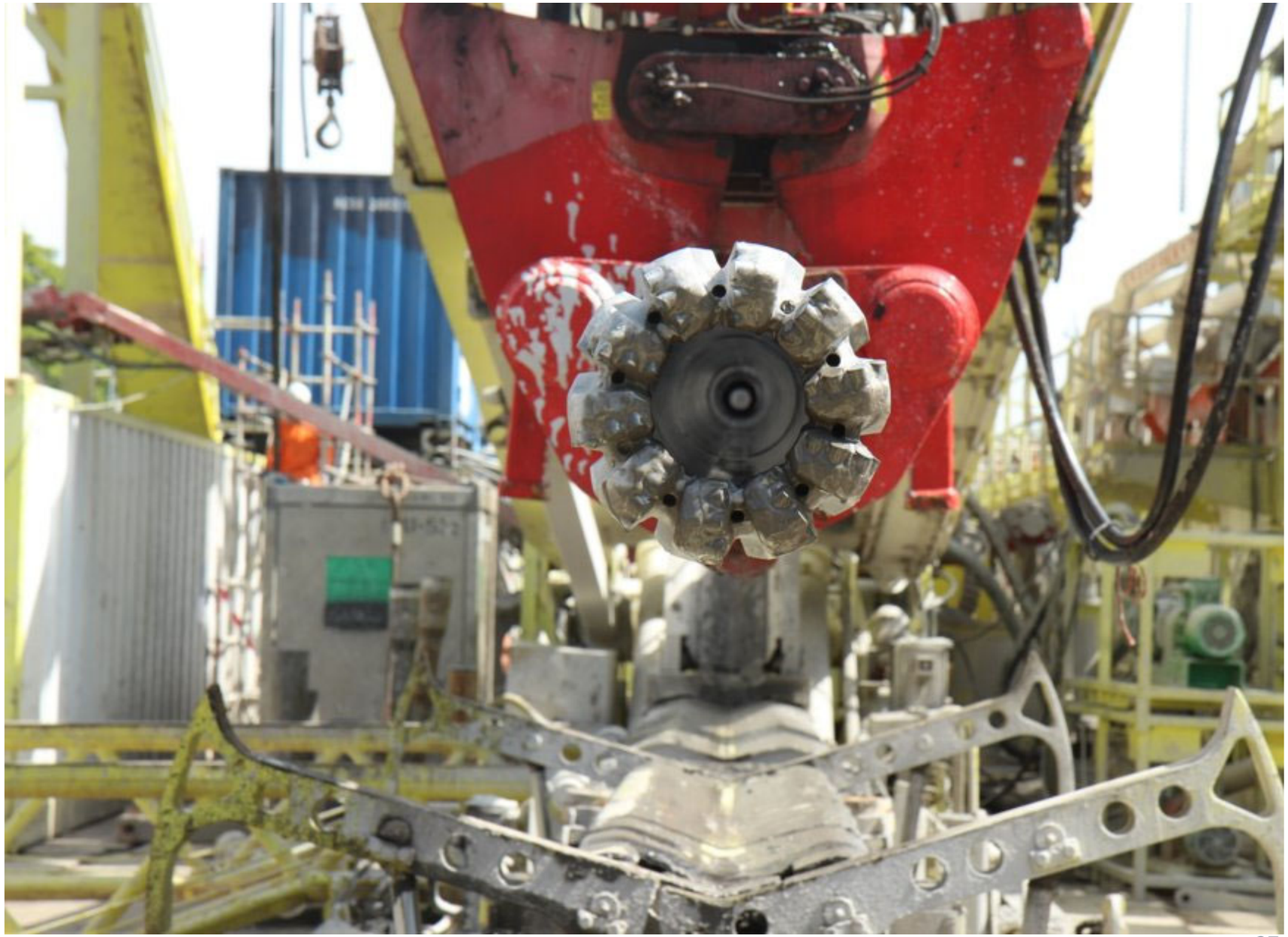
- Huisman LOC400
- Batch drilled
- WBM -> OBM
- ~7500m total

Data gathering DEL-GT-01/02

1. Coring
2. Open-hole logging
3. Fiber optics
4. High frequency cutting sampling

Coring

Coring



Coring

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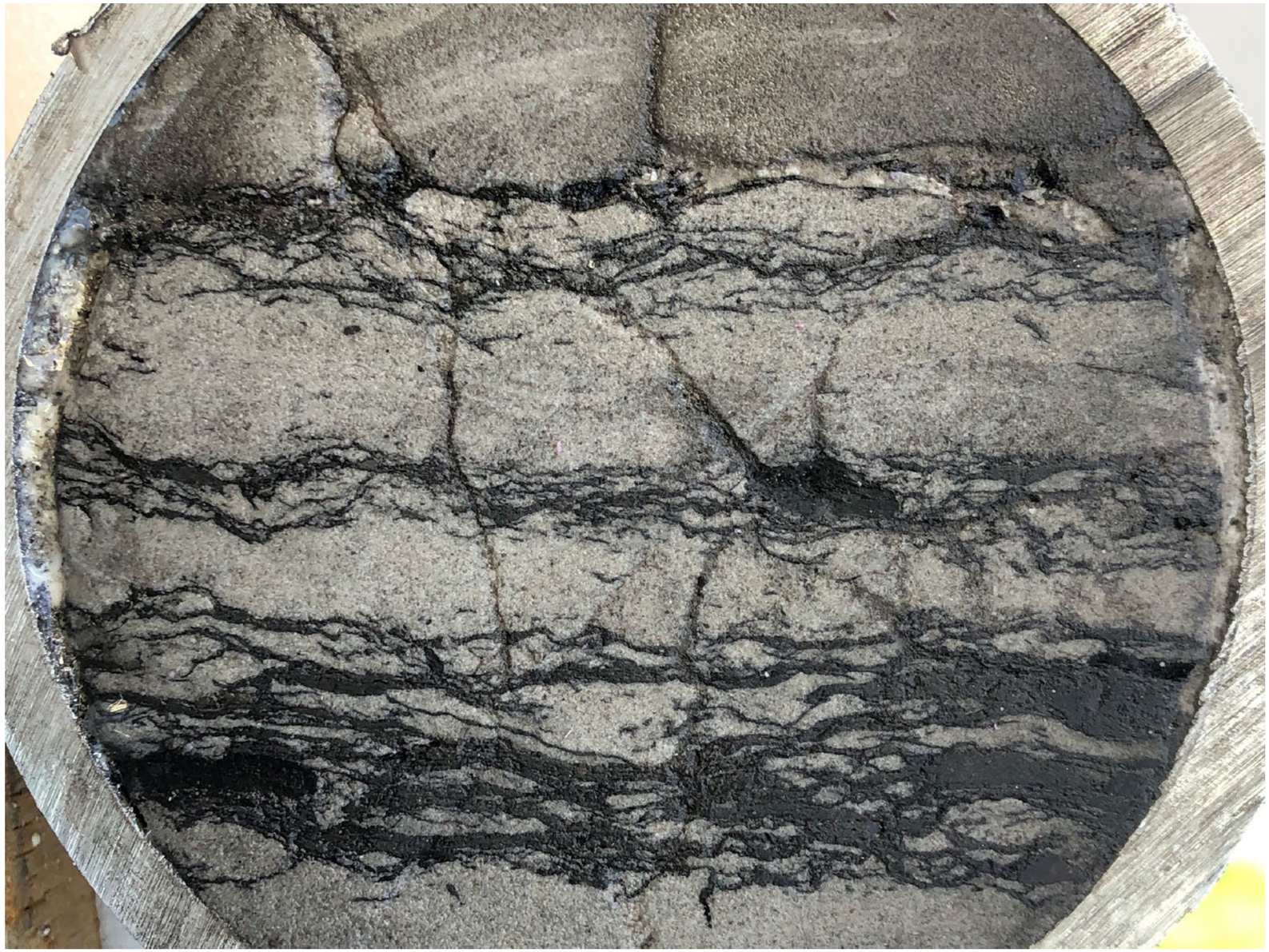
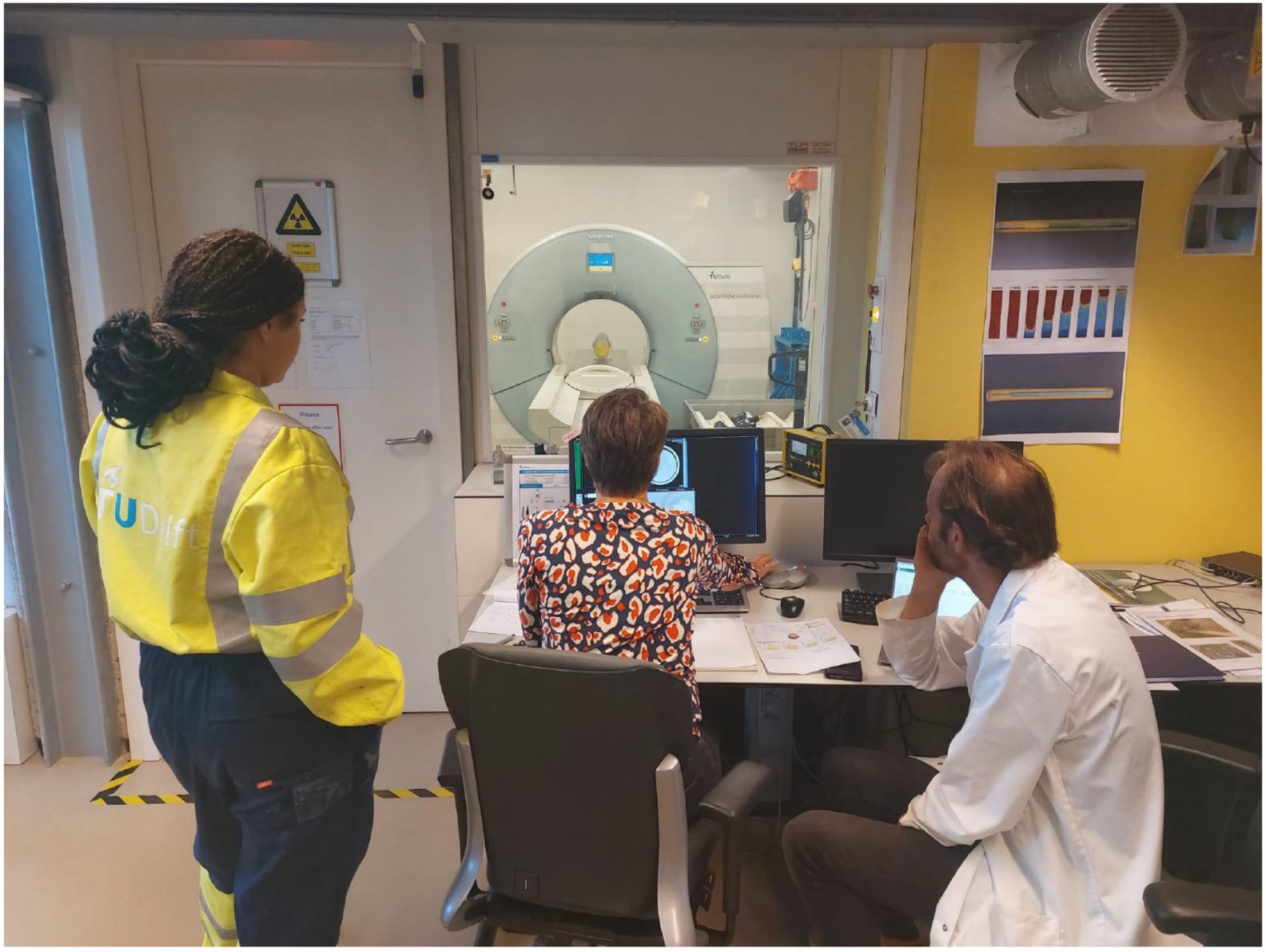


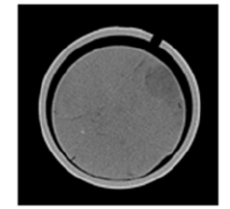
Delft Sandstone 2650.0m MD

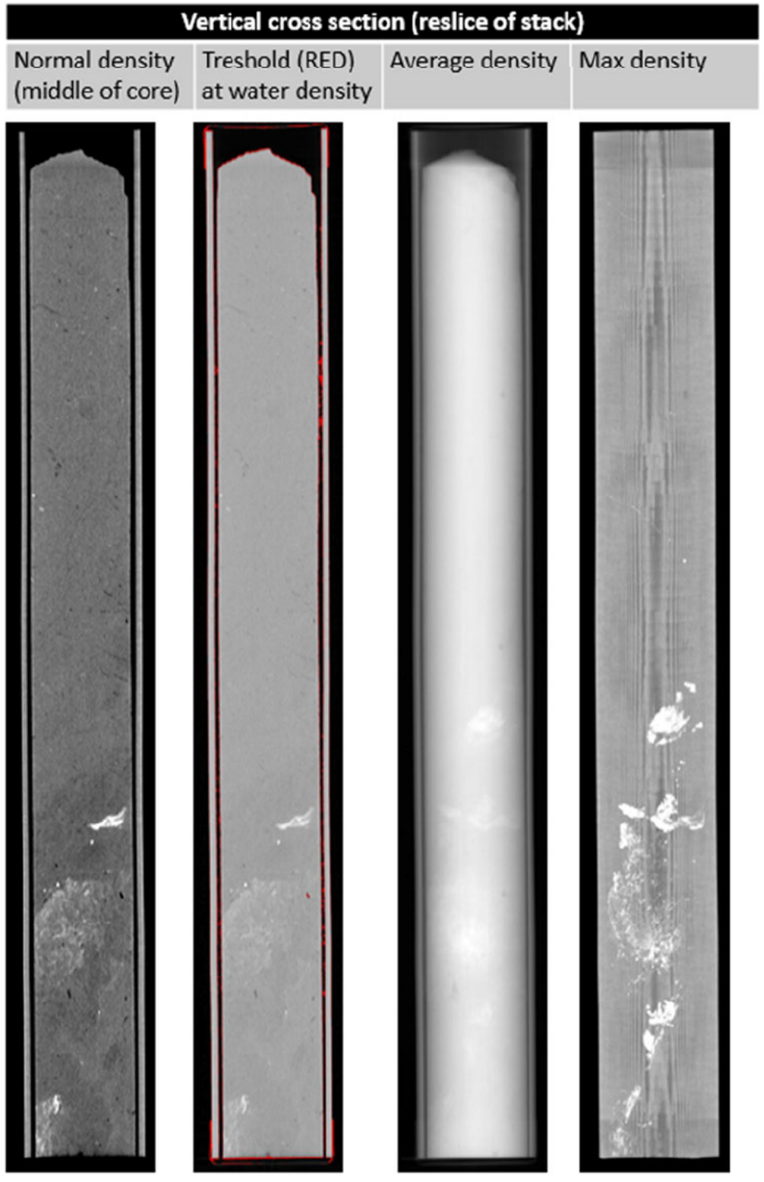
Coring

CT scanning of the cores

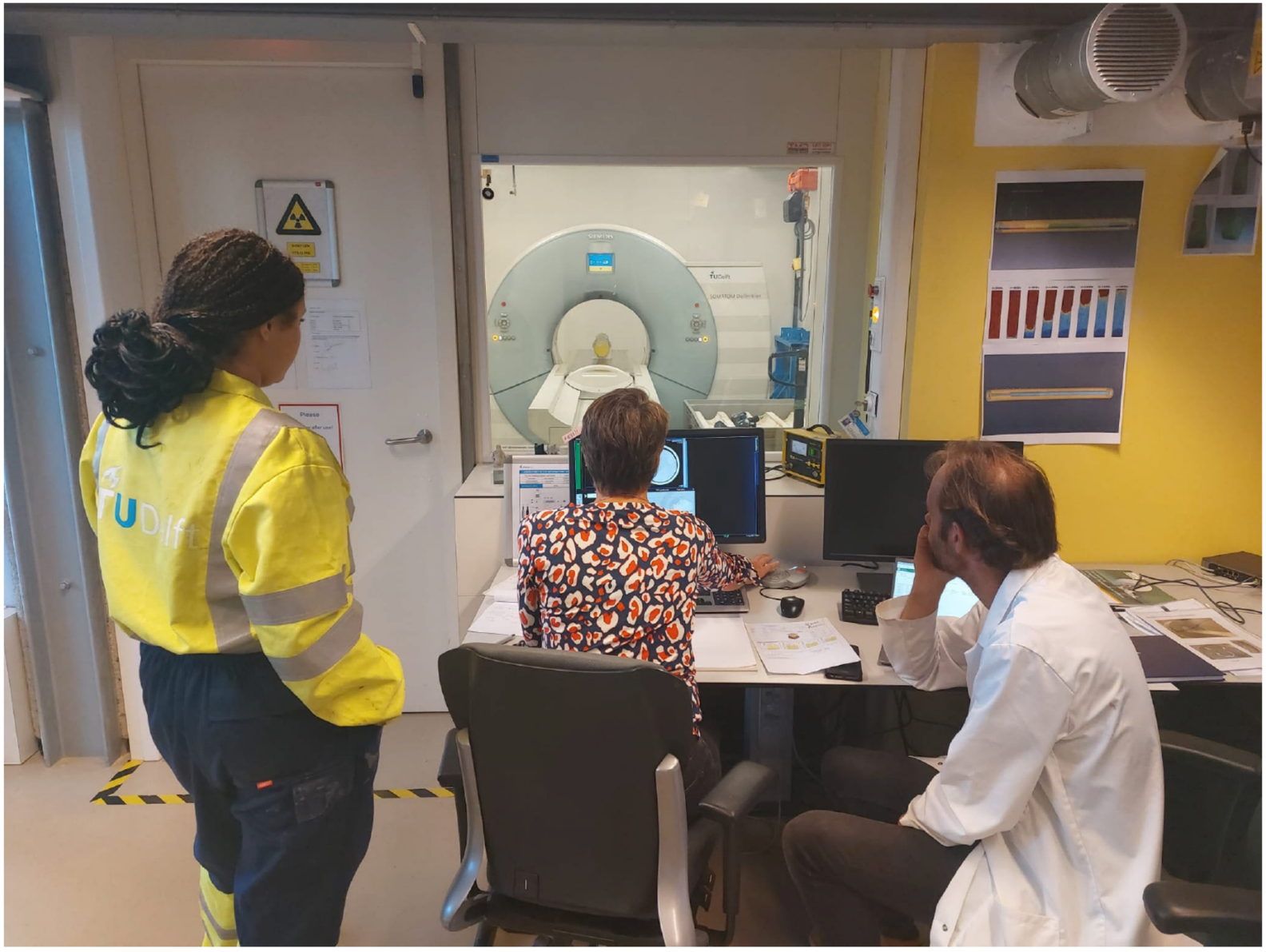
DELGT01-C1-1







CT scannen kernen



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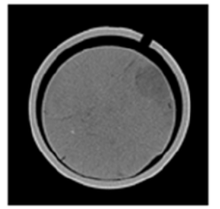
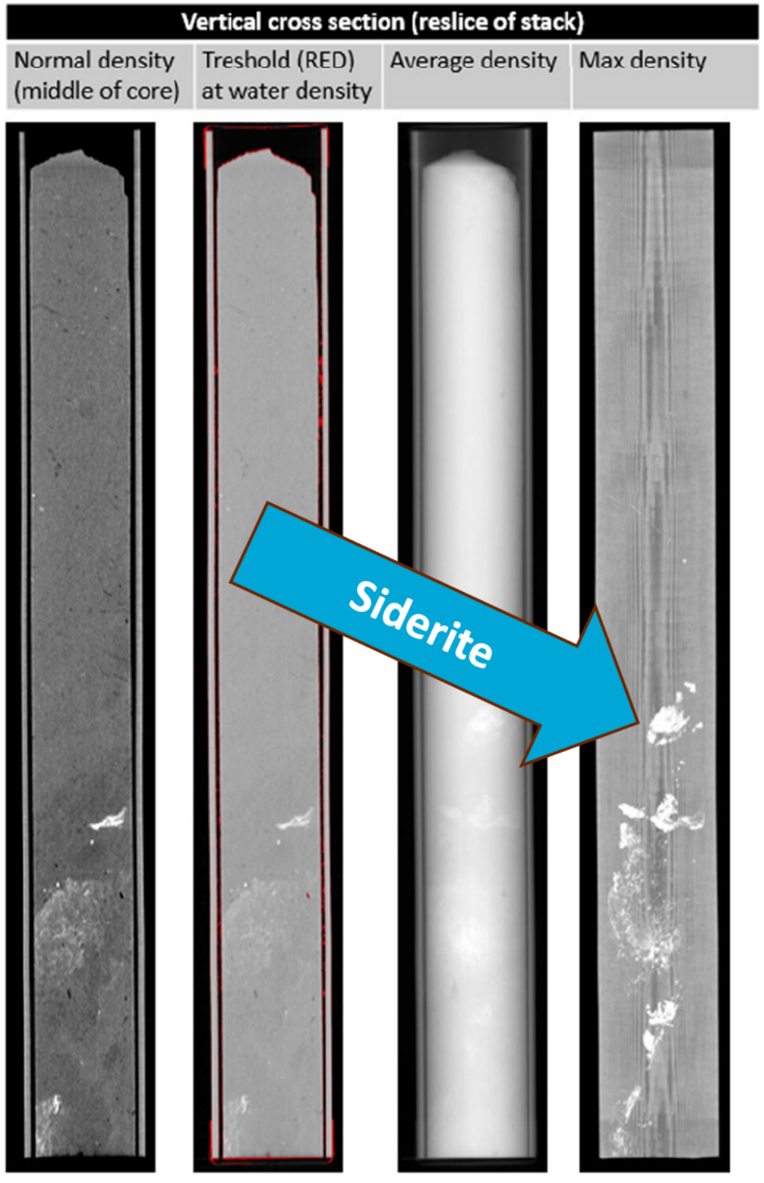
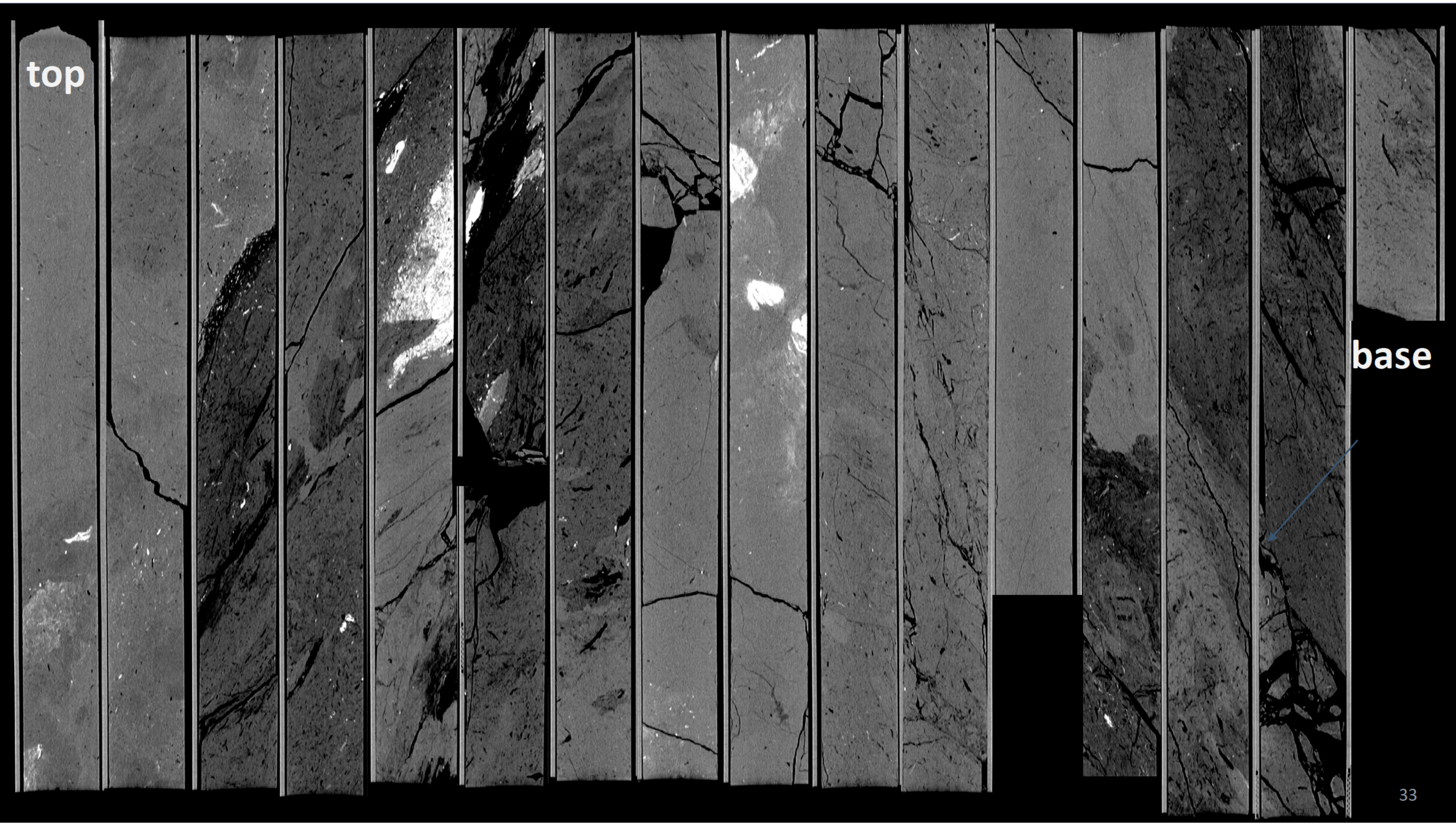
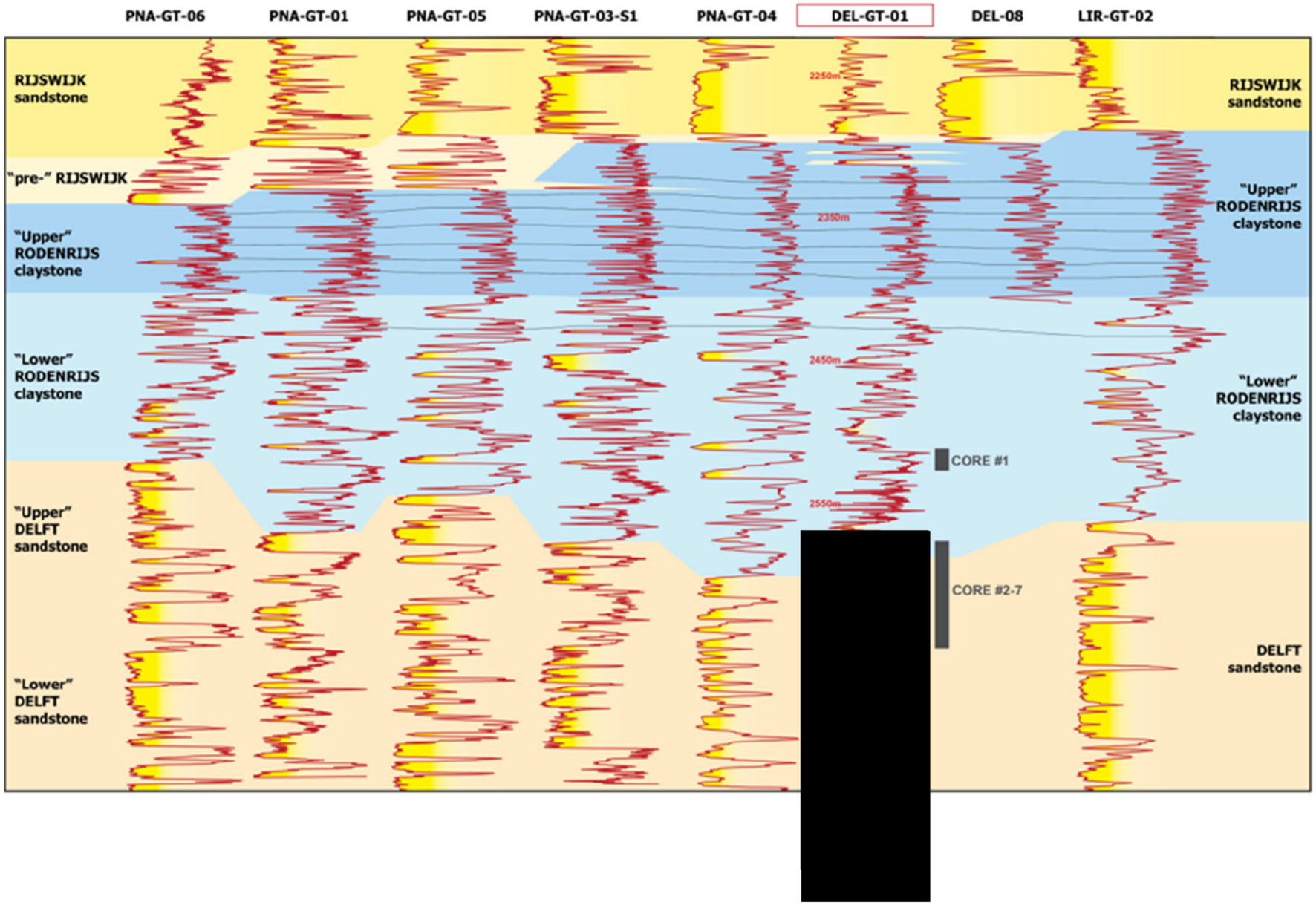




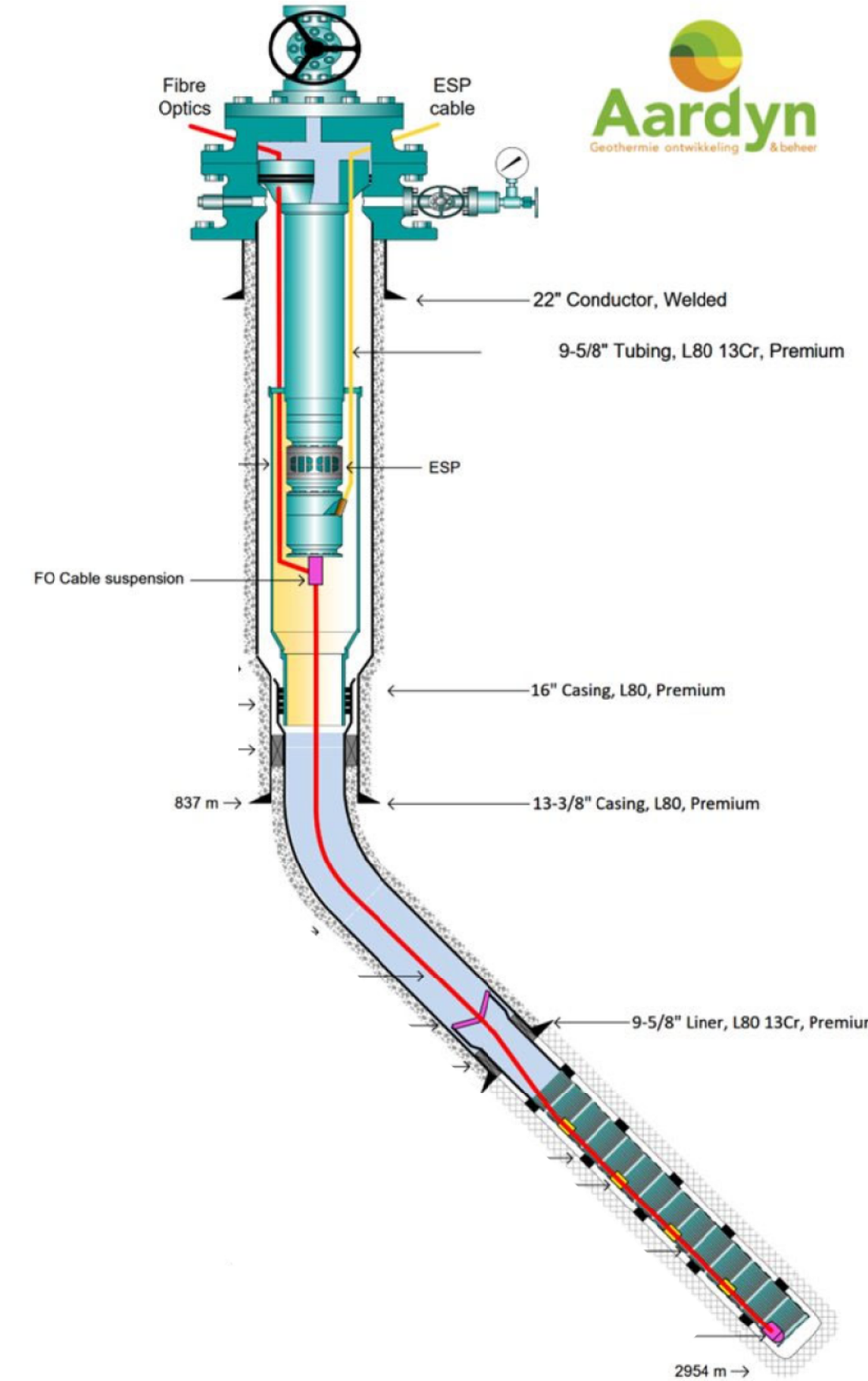

top
base

Reservoir variability



Fibre optics

Producer cable
Hanging in casing from ESP to TD
DTS / DPS / DAS
Single mode fibre
Total length 3000m
Will be installed with ESP



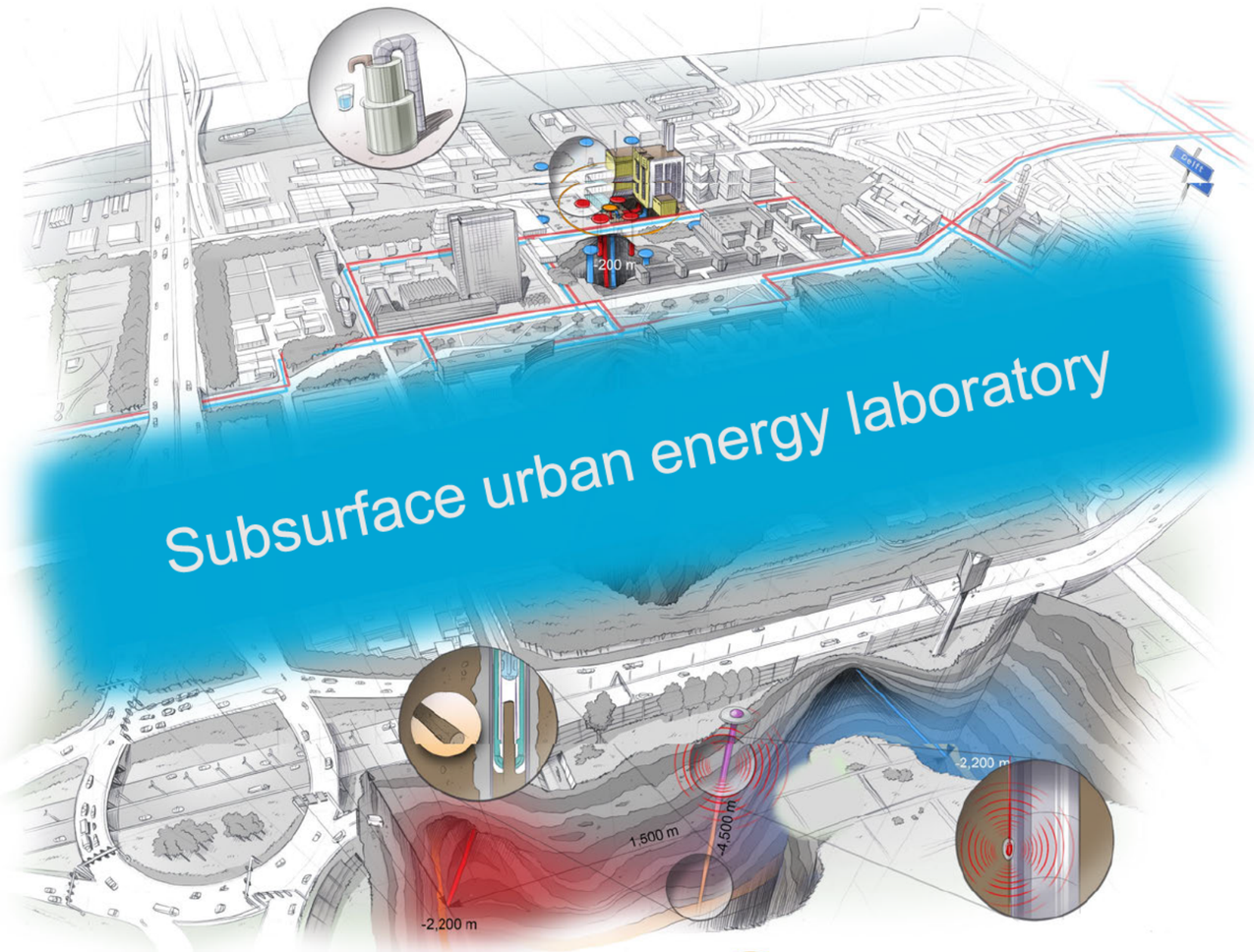
Factsheet

Succesfull research campaign

A lot of exposure for urban geothermal energy

Many involved students

	amount
Expected flow	up to 400 m^3/hr
Expected power	25 MWt
4” cores (meter)	86
Sidewall cores	79
Cutting samples	2500
Logging (meter)	>2500
Visitors viewing platform	>1000
Students onsite	>100



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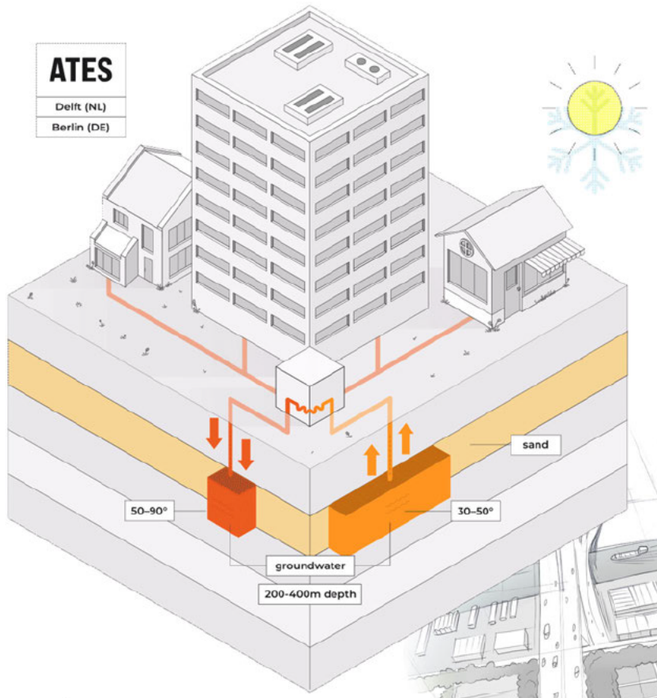
Future work

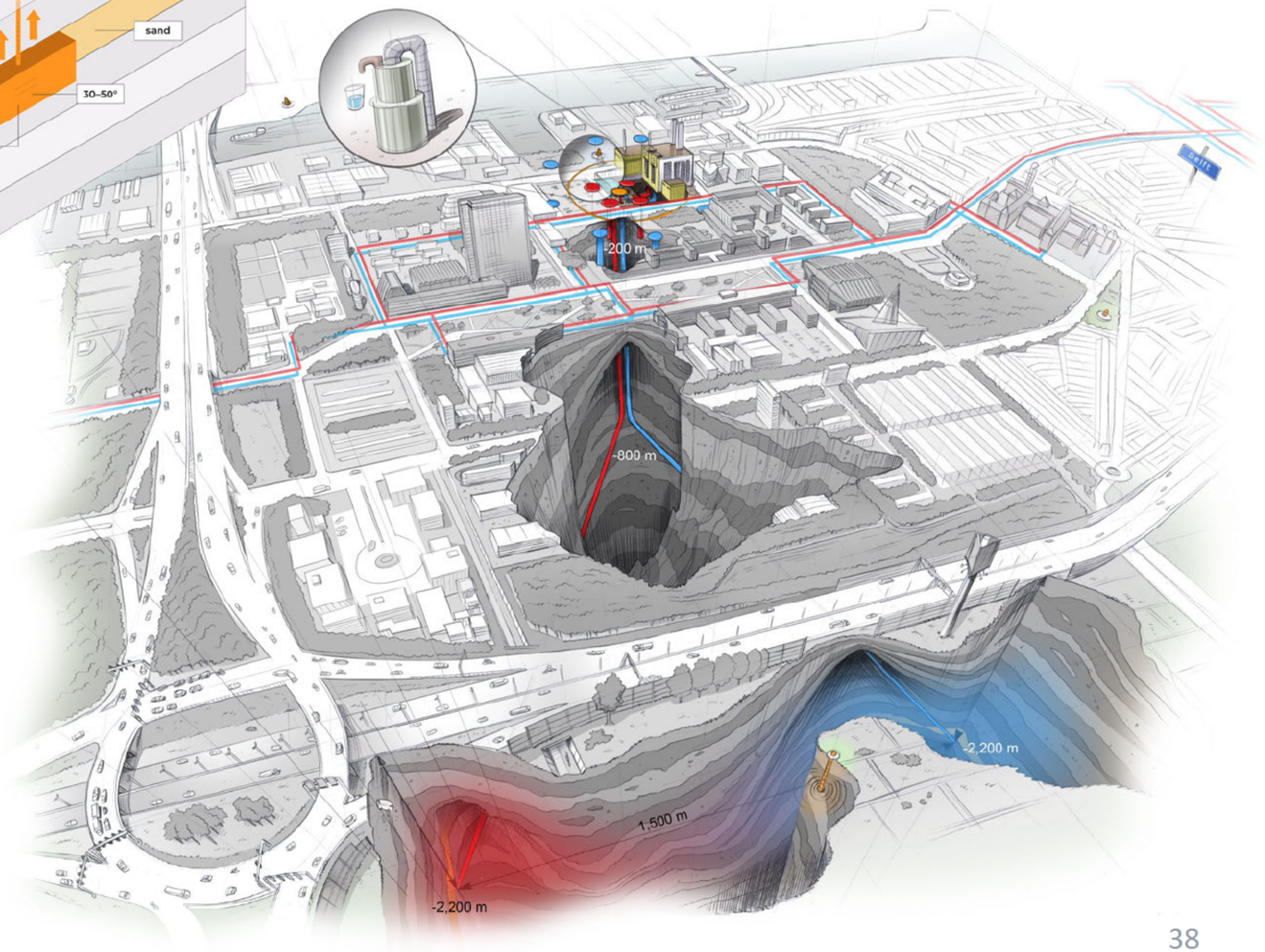
1. Process and analyse of the gathered data
2. HT-ATES (Push-it)
3. More detailed scans of the cores
4. Production experiments (during the summer)
5. Intensive seismic monitoring
6. Deep monitoring borehole

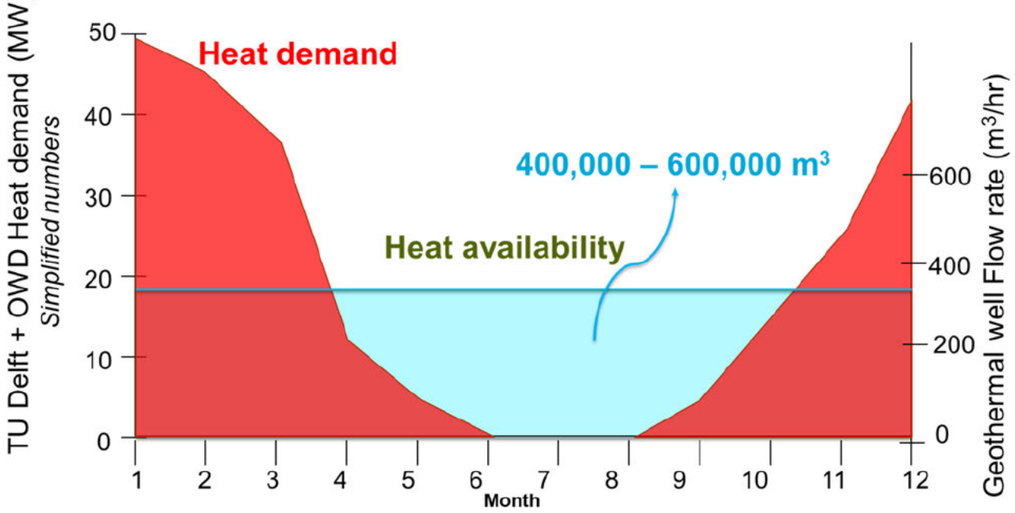
HT-ATES

High Temperature

Aquifer Thermal Energy Storage

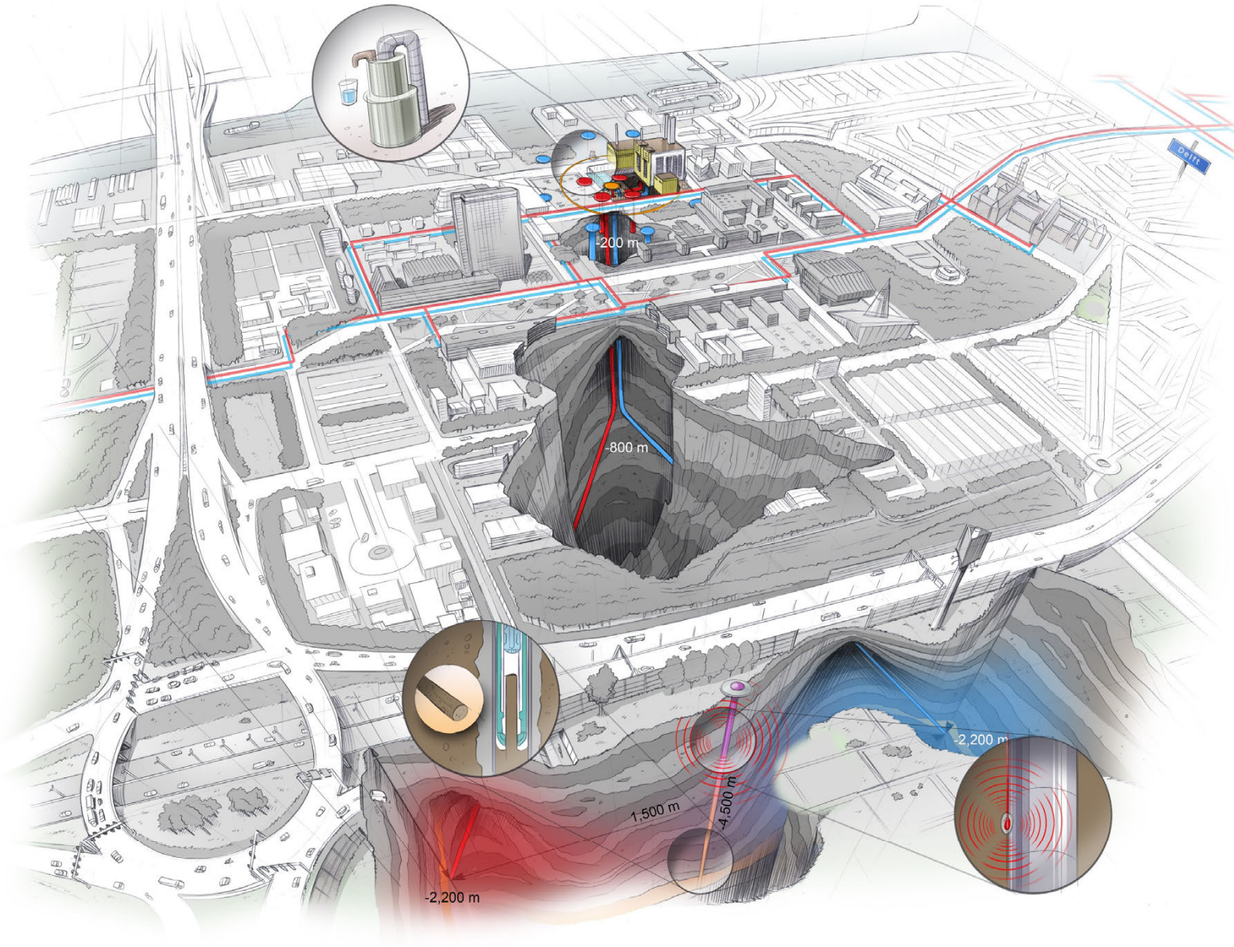






Deep Monitoring Borehole

- Funded, drilled within five years
- (Near) vertical well
- Plan to drill to 4500m depth (TVD)
- ‘no flow’ monitoring well
- Drill through the reservoir between PROD & INJ
- Seismic monitoring
- Fiber optics
- Continuous coring



Collaborations

Financed by:

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Partners:

Aardyn Geothermie ontwikkeling & beheer

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Baker Hughes

Huisman Geo

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www.tudelft.nl/geothermalwell

icdp | **Workshop Call**

Application deadline: **14 March, 2024**

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Brand new Delft doublet with promising scientific future

b.t.m.vanesser@tudelft.nl

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