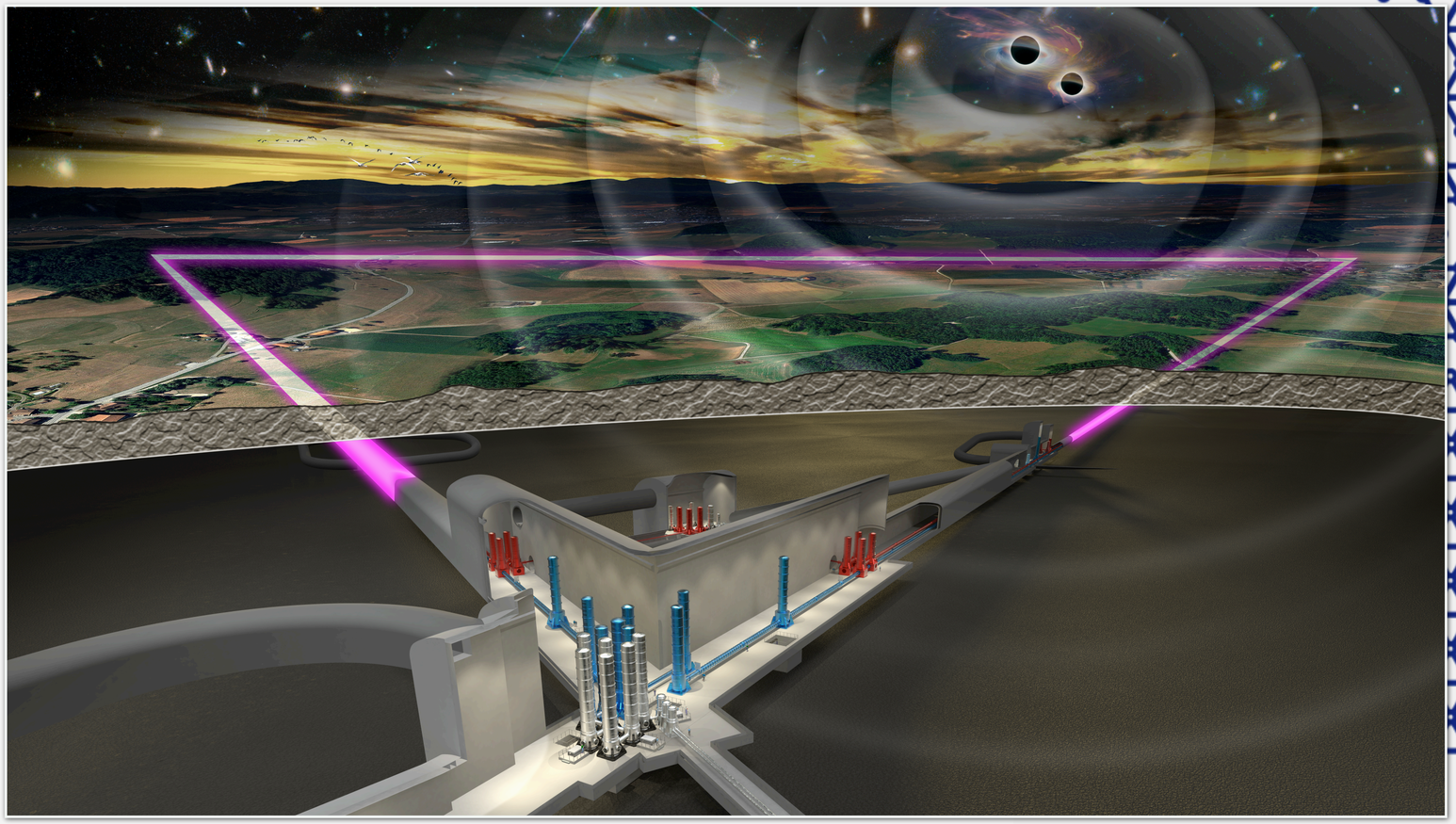

EINSTEIN TELESCOPE EMR REGION

Project Office - Maastricht

Maastricht, May 10, 2024

HIGH-TECH AND INNOVATION AREA IN EMR

EMR - Eindhoven-Leuven-Aachen region USP:

1. Soil ideal for dampening vibrations with relatively quiet high-quality landscape
2. Centrally located in the high-tech region with good research institutes
3. Attractive international living and business climate with good infastructure, good education and the area is multilingual
4. The research institutes and industry are already cooperating fully in the preparations with research and innovation projects
5. A solid preparations of feasibility studies and three countries joining forces in a host consortium

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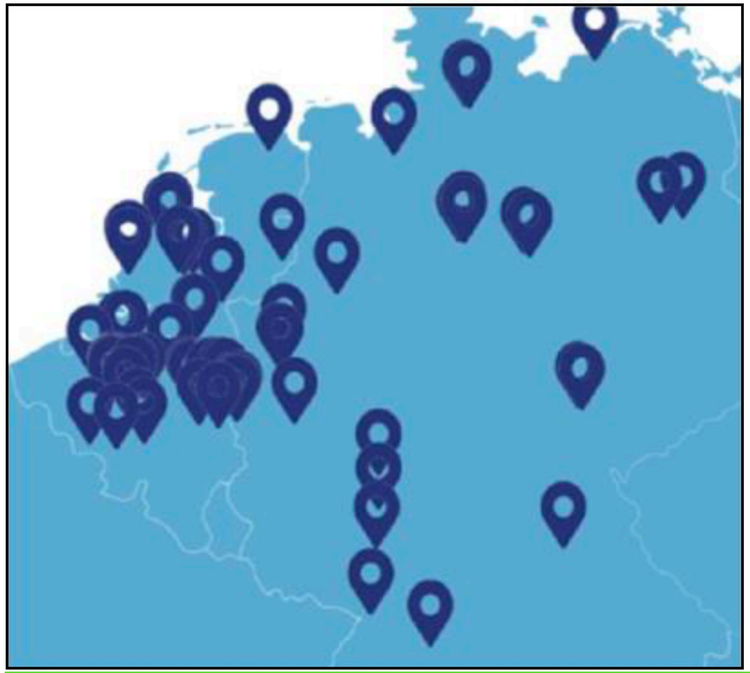
CLOSE RELATION WITH KNOWLEDGE INSTITUTIONS

Signed MoU to collaborate for the ET-EMR

ELAT - Eindhoven, Leuven, Aachen Technology Triangle



Many partners signed MoU and actively support ET

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ETPATHFINDER

The Flemisch minister Jo Brouns and minister Robbert Dijkgraaf at the ETpathfinder.

ETpathfinder ‘no regret’

- Delivers on all fronts
  - SEP: *”The committee applauds the progress so far, including the ETpathfinder project, ..."*

Nieuws

Eerste toekenning uit R&D-regeling Einstein Telescope voor hightech bedrijven

Een Nederlands consortium van de bedrijven Demcon kryoz uit Enschede en Cooll uit Hengelo en de Universiteit Twente ontvangen een subsidie om een geavanceerd koelsysteem te ontwikkelen voor de Einstein Telescope.

19 februari 2024

Example: Cryocooling for ET/ETpathfinder

Test facilities

Maastricht University

Cryogenic precooler

STIRLING CRYOGENICS

Cryogenic vibration suppression

JPE Driven by innovation

Universiteit Leiden

Cryogenic transfer lines

cryoworld advanced cryogenics

System Architect

Nikhef

LN_2 infrastructure

DEMACO

Zero-vibration Sorption Cryocooler

DEMCON

KRYOZ

UNIVERSITY OF TWENTE.

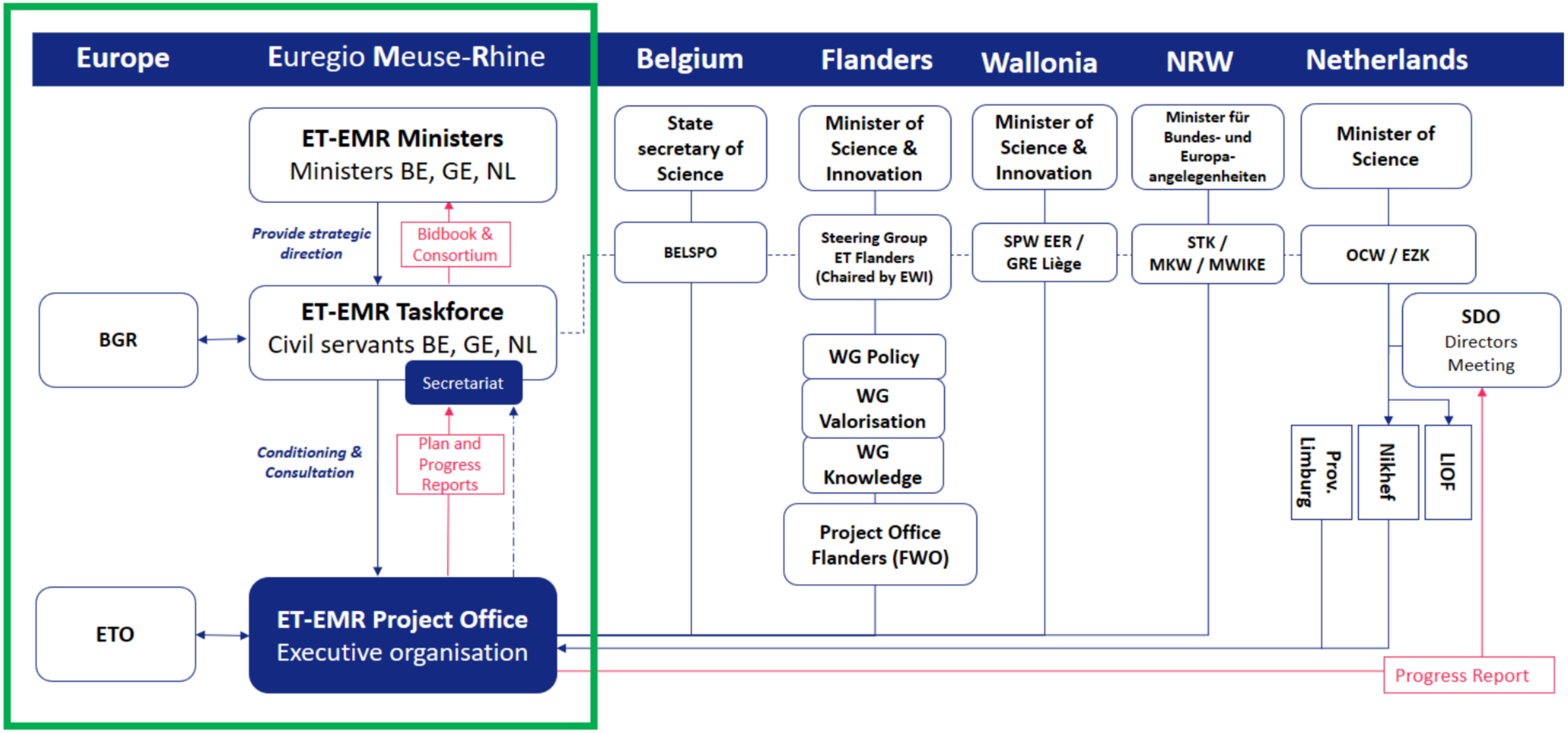
COOLL

INSTALLATION PROJECT OFFICE

Installation of the Project Office by all EMR ministers

- Financial commitments from Belgium (VLA, WAL, BELSPO), NRW & BMBF, NL
  - Contributions for the feasibility studies

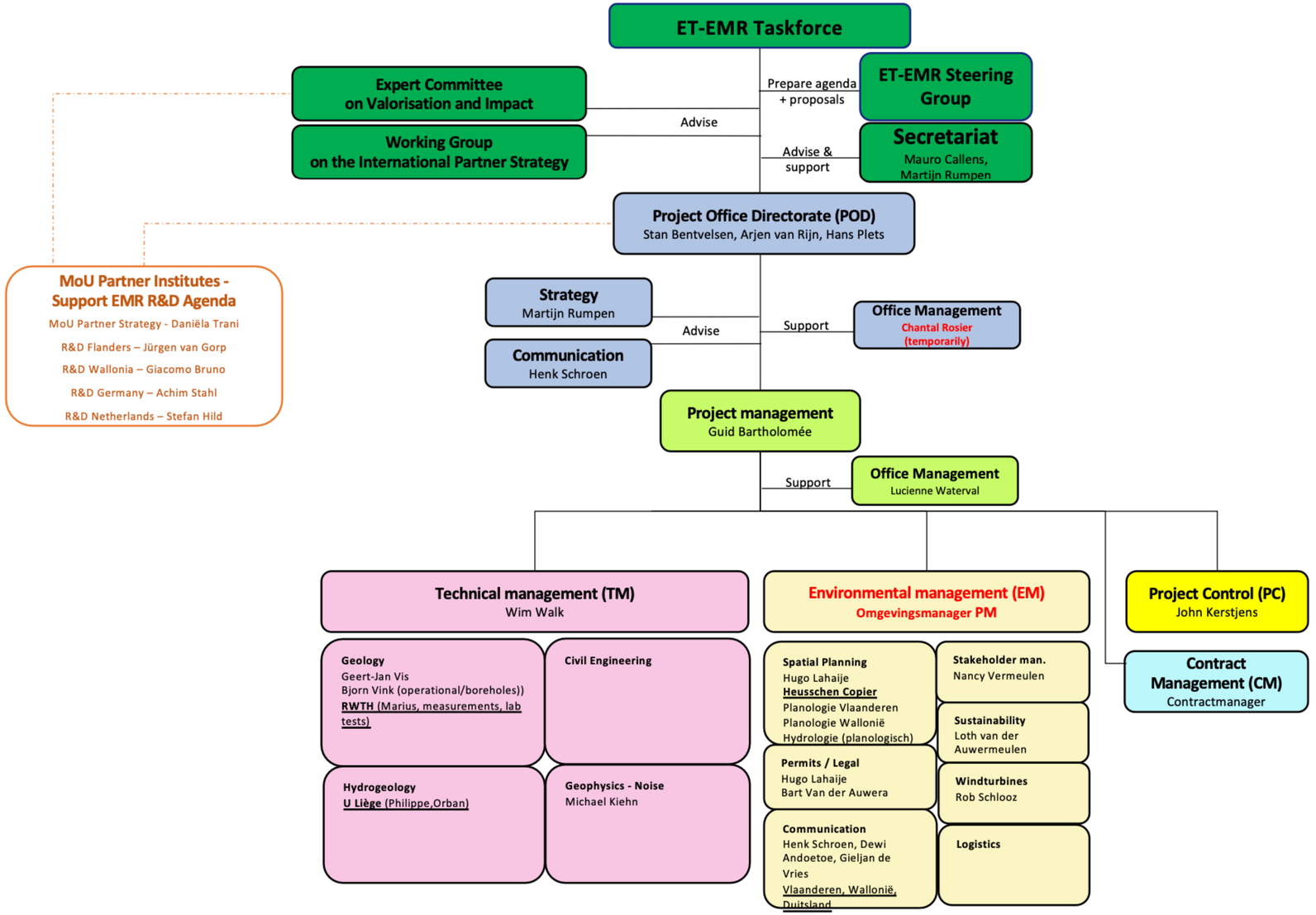
EMR PROJECT OFFICE - IN & OUT FLOW



PROJECT OFFICE ORGANOGRAM

Integral project management

- Environmental issues
  - legal aspects
  - sustainability
  - spacial planning
- Subsurface issues
  - geology
  - geophysics
  - hydrology
  - civil engineering
- Project control
- Communications

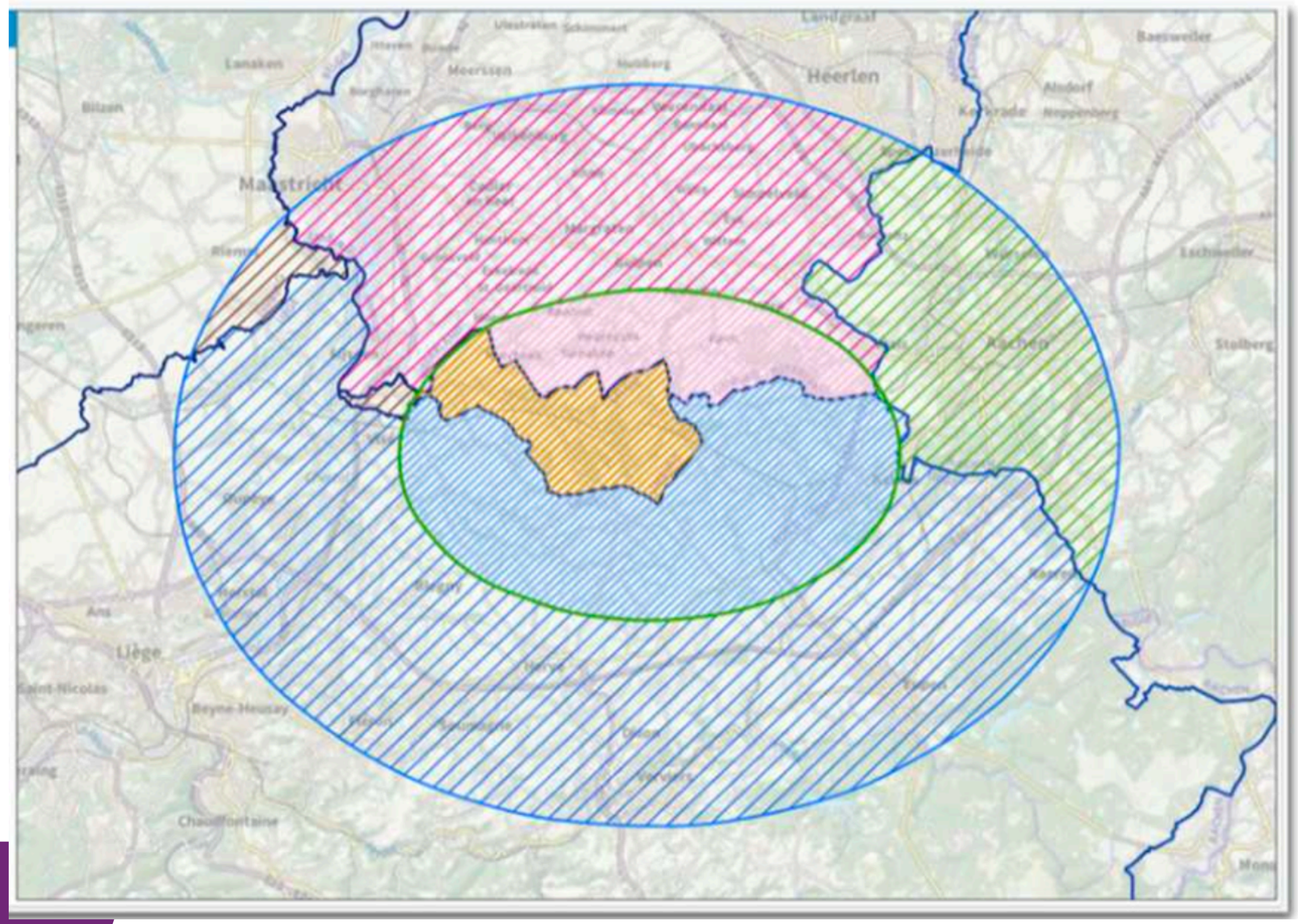


PROJECT OFFICE TEAM

Integral Project Management

- A selection of the people, in total currently ~30 persons involved

MORTUARIUM ON WINDTURBINES



NL:

- Moratorium legislation.

BE:

- Turbine initiative halted by court rulings.

NRW:

- Agreement with Aachen.

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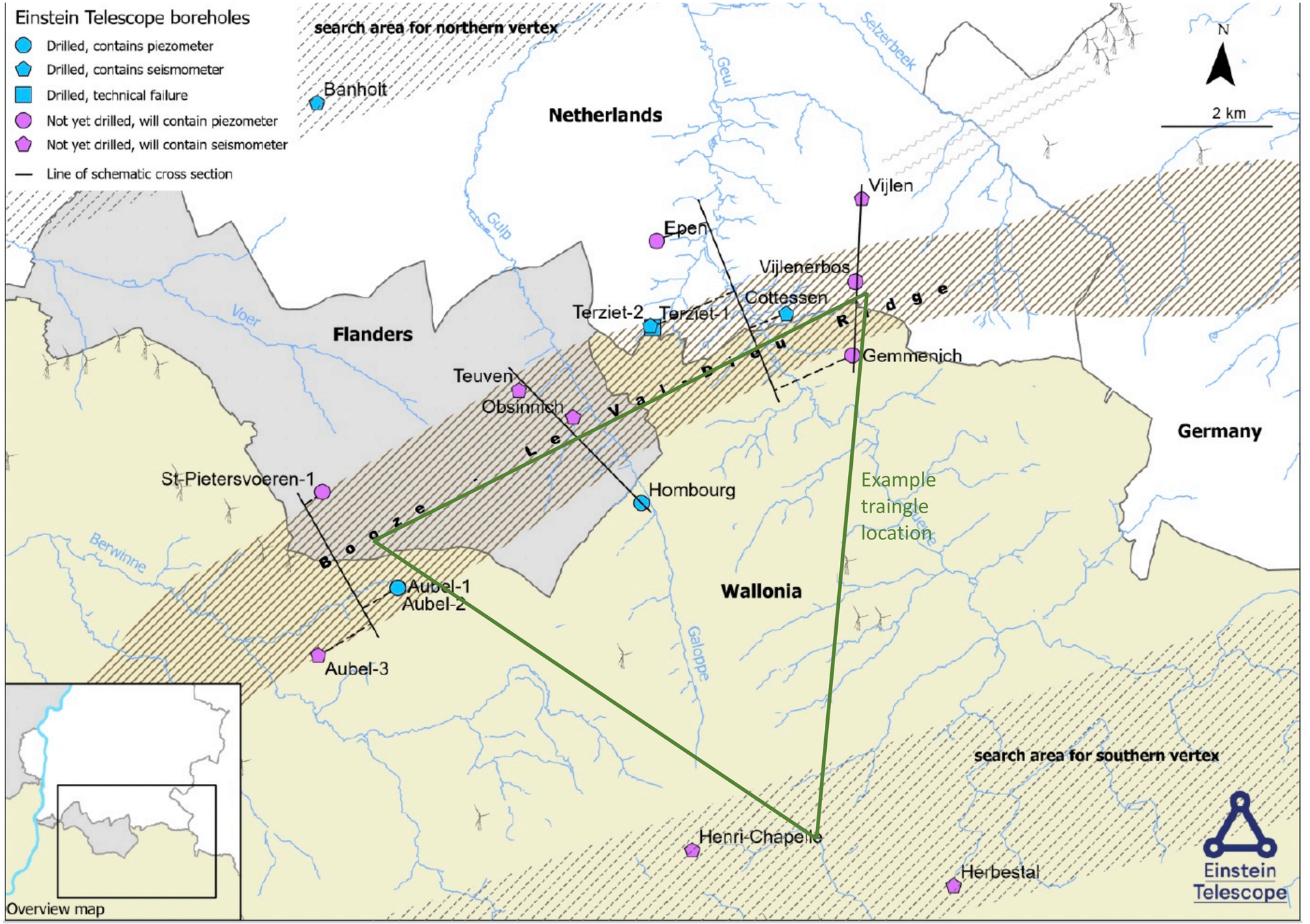
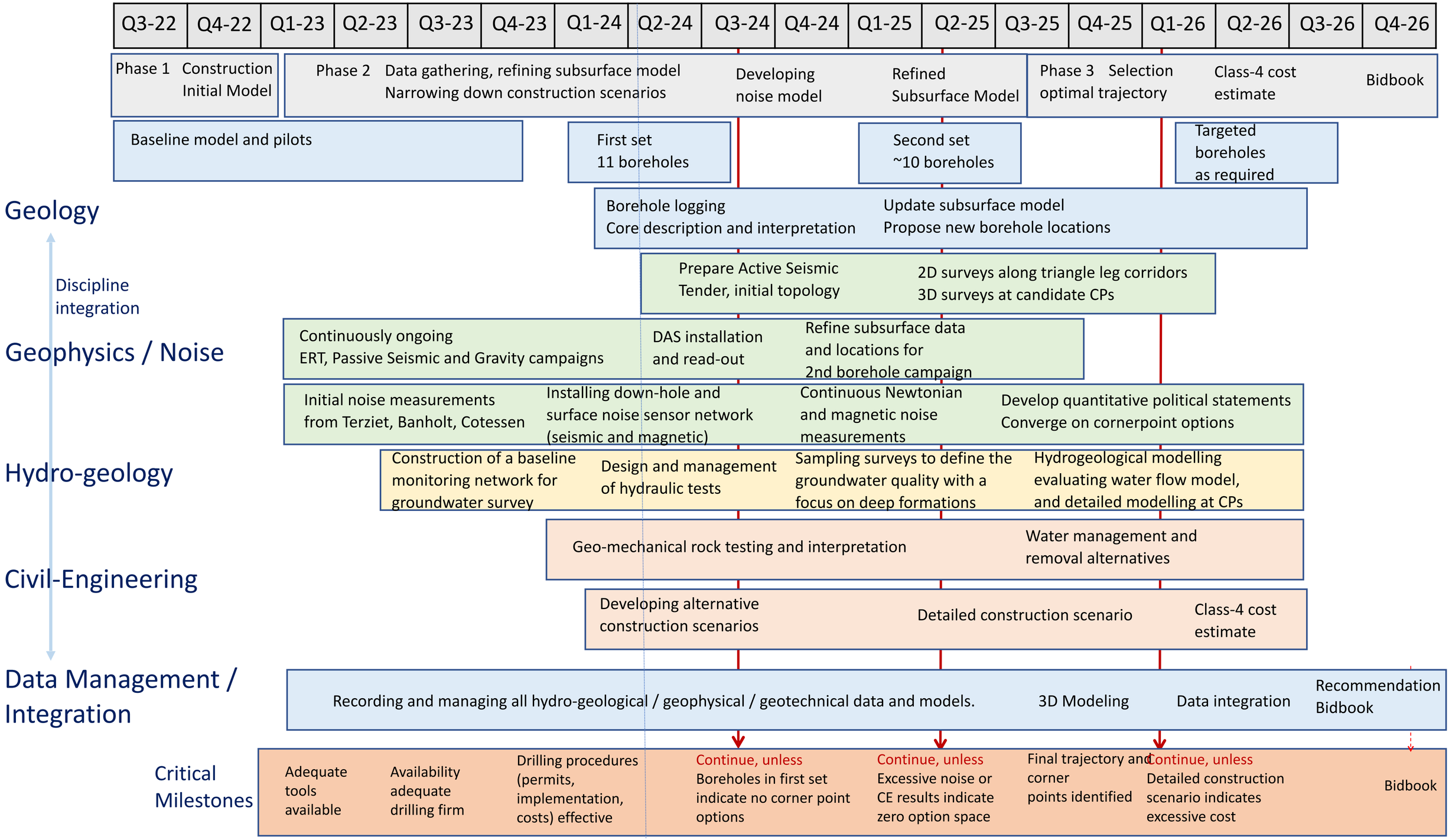


Hombourg	✅
Sint Pieters Voeren	✅
Gemmenich	Completing
Teuven	Pre-drill completed
Obsinnich	Pre-drill completed
Henri Chapelle	Starts May 15th
Aubel-2	Pre-drill completed
Epen	Site Preparation
Vijlen	
Herbesthal	
Vijlner Bos	


Q3-22
Q4-22
Q1-23
Q2-23
Q3-23
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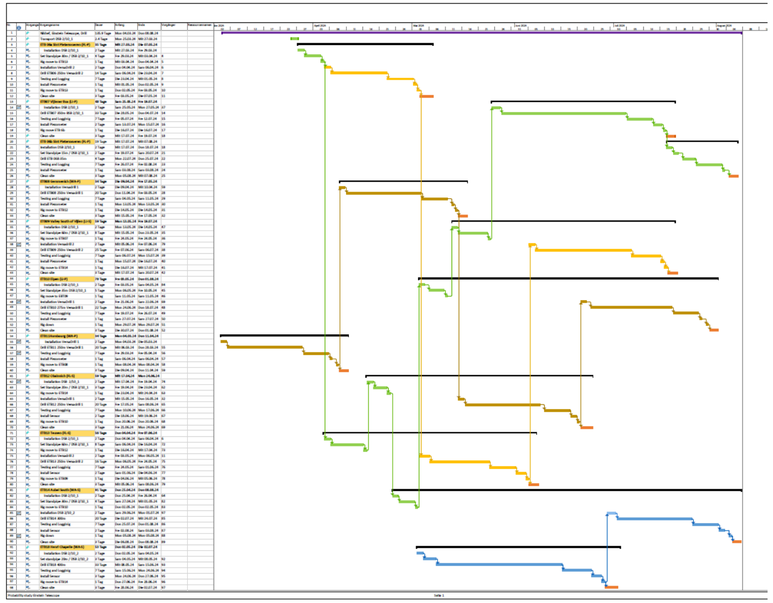
Q3-24
Q4-24
Q1-25
Q2-25
Q3-25
Q4-25
Q1-26
Q2-26
Q3-26
Q4-26
Phase 1 Construction Initial Model
Phase 2 Data gathering, refining subsurface model Narrowing down construction scenarios
Developing noise model
Refined Subsurface Model
Phase 3 Selection optimal trajectory
Class-4 cost estimate
Bidbook
Baseline model and pilots
First set 11 boreholes
Second set ~10 boreholes
Targeted boreholes as required
Geology
Borehole logging Core description and interpretation
Update subsurface model Propose new borehole locations
Discipline integration
Prepare Active Seismic Tender, initial topology
2D surveys along triangle leg corridors 3D surveys at candidate CPs
Geophysics / Noise
Continuously ongoing ERT, Passive Seismic and Gravity campaigns
DAS installation and read-out
Refine subsurface data and locations for 2nd borehole campaign
Initial noise measurements from Terziet, Banholt, Cotessen
Installing down-hole and surface noise sensor network (seismic and magnetic)
Continuous Newtonian and magnetic noise measurements
Develop quantitative political statements Converge on cornerpoint options
Hydro-geology
Construction of a baseline monitoring network for groundwater survey
Design and management of hydraulic tests
Sampling surveys to define the groundwater quality with a focus on deep formations
Hydrogeological modelling evaluating water flow model, and detailed modelling at CPs
Civil-Engineering
Geo-mechanical rock testing and interpretation
Water management and removal alternatives
Developing alternative construction scenarios
Detailed construction scenario
Class-4 cost estimate
Data Management / Integration
Recording and managing all hydro-geological / geophysical / geotechnical data and models.
3D Modeling
Data integration
Recommendation Bidbook
Critical Milestones
Adequate tools available
Availability adequate drilling firm
Drilling procedures (permits, implementation, costs) effective
Continue, unless Boreholes in first set indicate no corner point options
Continue, unless Excessive noise or CE results indicate zero option space
Final trajectory and corner points identified
Continue, unless Detailed construction scenario indicates excessive cost
Bidbook

First Drilling Campagn:

- 11 boreholes:
  3 in NL
  4 in Flanders
  4 in Walloon
- Two completed, now drilling 3, 4
- Pre-drilling 5 and 6
- Ending mid-August



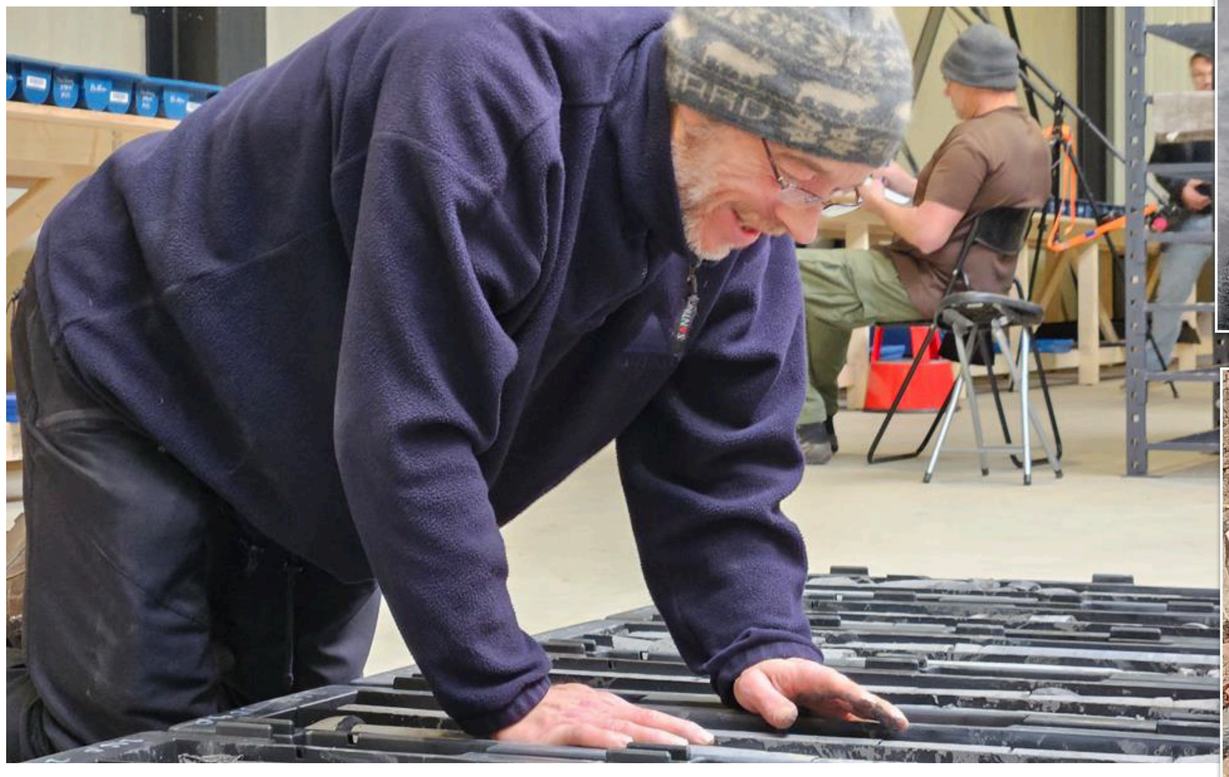
- Uses 4 drilling rigs in parallel
- Complex Logistics

Core evaluation started

Gemmenich and St. Pieters-Voeren currently drilling

Drilling Hombourg
completed on schedule

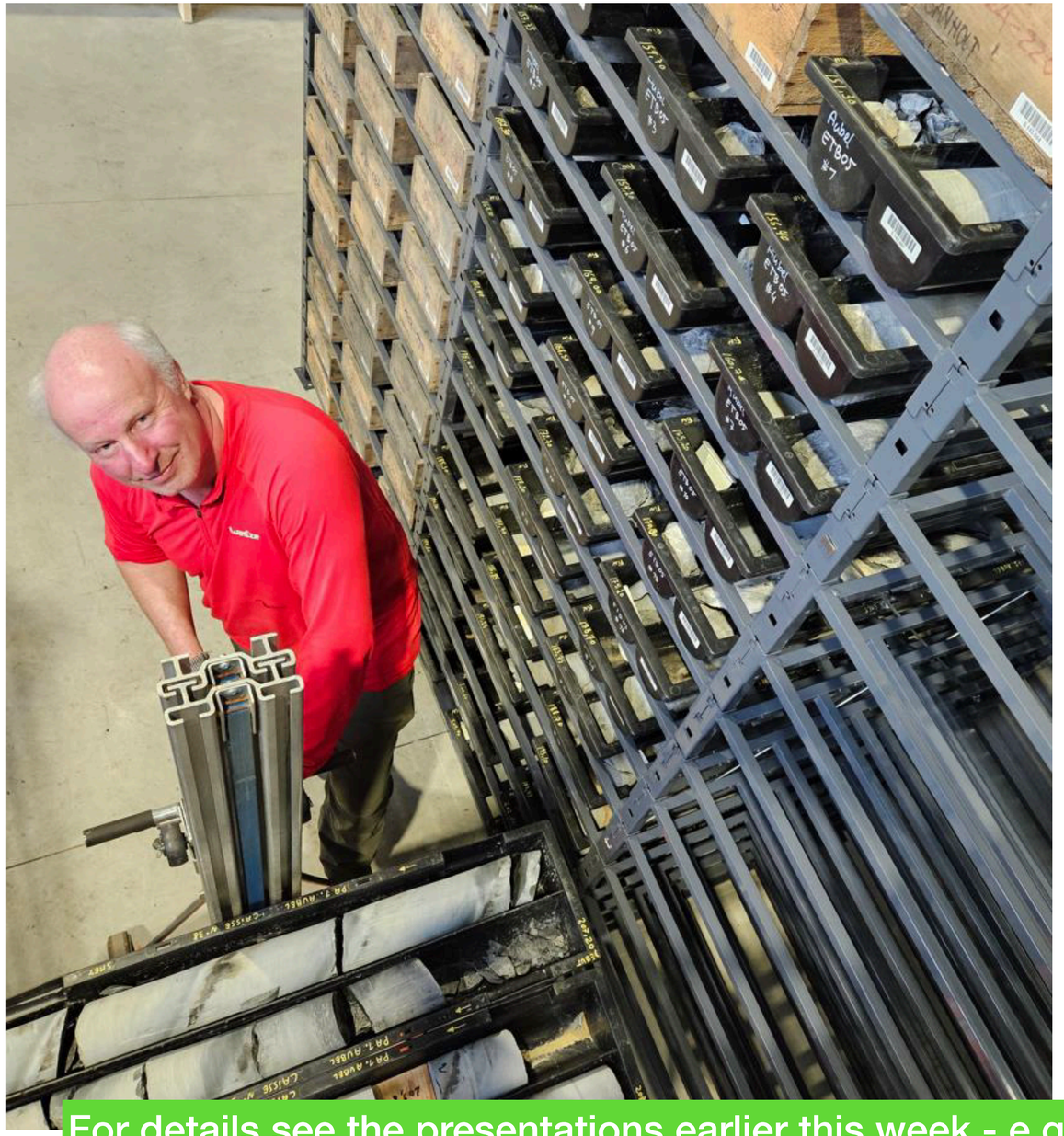
Hombourg, 250m



Core Logging and Evaluation
by experienced team of geologists

Hard “Competent” Deep Layers

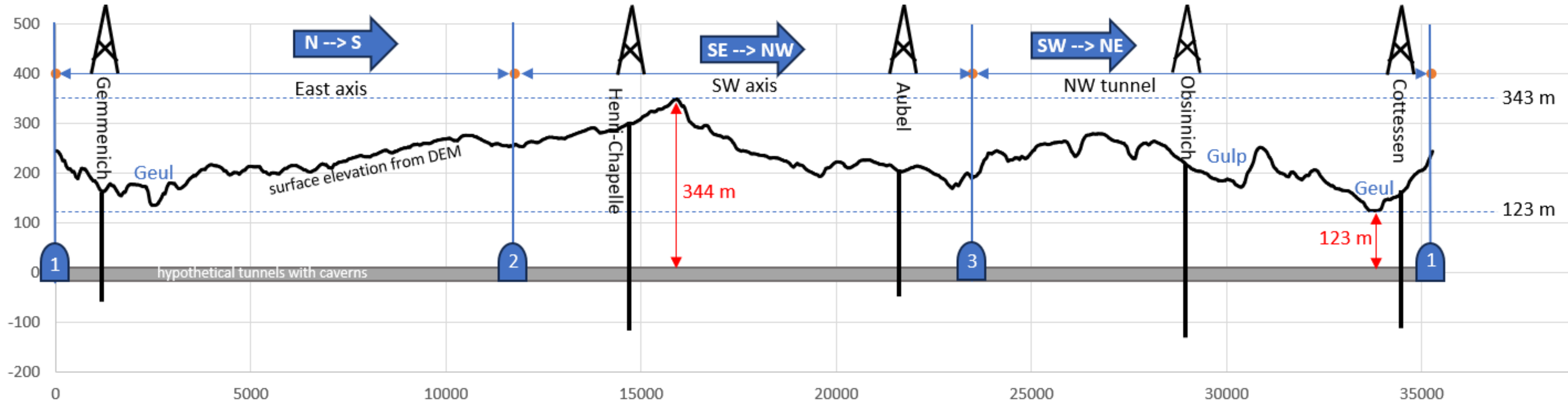
Soft Shallow Layers



For details see the presentations earlier this week - e.g. Wim Walk

WHAT IT COULD LOOK LIKE

- A perfectly horizontal tunnel
- Projection with triangle legs mapped in a straight line
- Can be moved to lower depth if necessary



For civil work plans in the environment we urgently need more details of the design of the infrastructure

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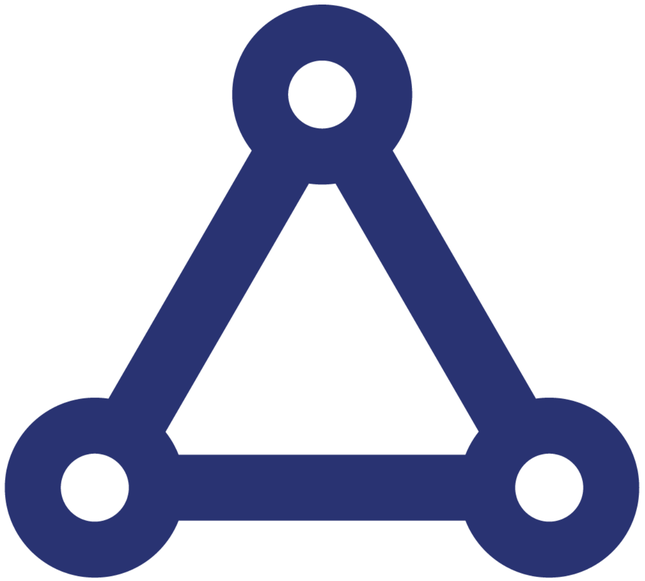

Einstein Telescope