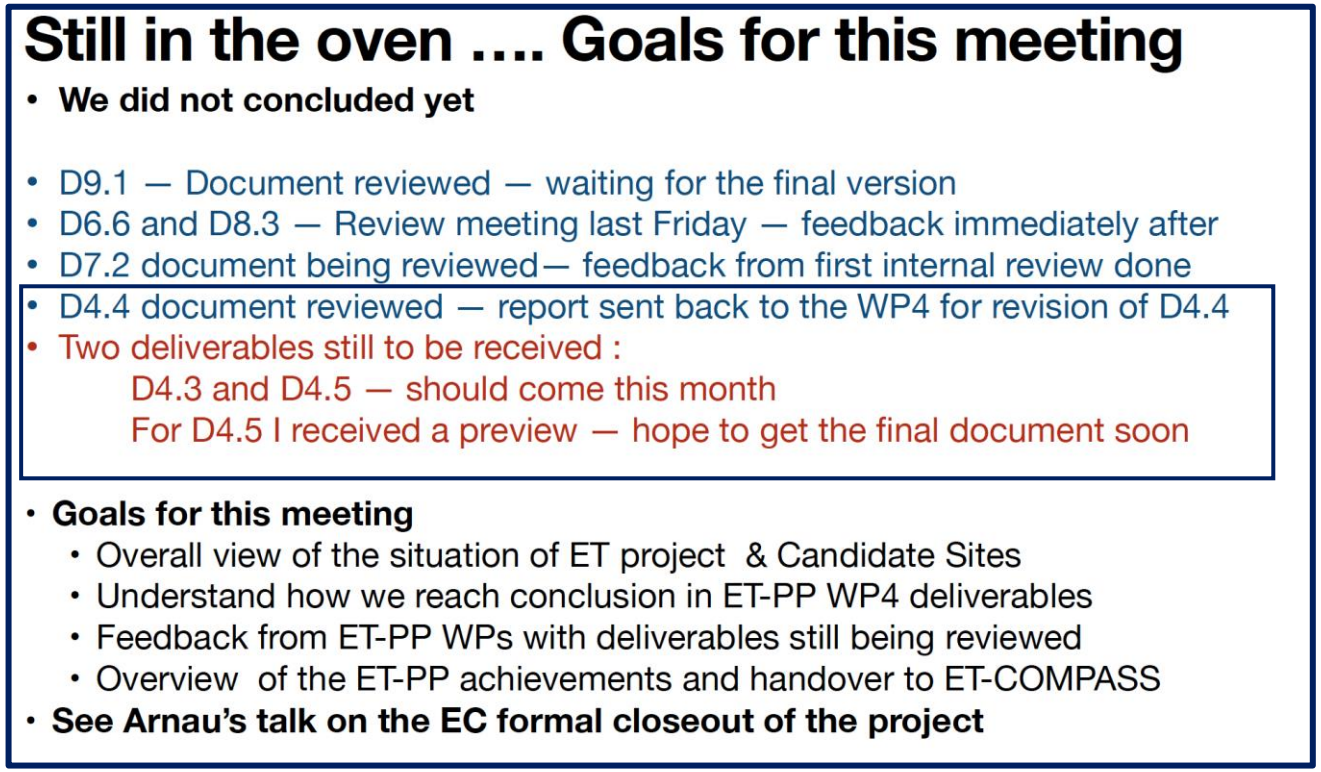
# WP4 – Site Preparation

- Steady progress toward the three final deliverables redefined in the GA amendment.
- Technical work converging towards major conclusions by end of this year (see yesterday)
- D4.3: Quantification of all aspects impacting ET performance.
- D4.4: First 3D Geology Model from each site using a consistent and common framework
- D4.5: Site Selection Criteria Document (Conclusions of the Site Selection Criteria Committee, SiSeC)
- All documents scheduled for delivery in ~~October 2026~~ November 2026 (Still in the oven…)

Mario's slide yesterday:



**Deliverable D4.3 Update:**

- Focus on review and standardization of numerical tools, using realistic geology, topography, underground infrastructure and measured seismic fields.

- Common validation program is being followed with benchmark tests. Tests are currently being performed by the participating teams.

- Documenting the simulation procedures and sharing the relevant inputs and outputs.

- Workshops completed:
    - Liège workshop 23-24 July
    - L'Aquila workshop 17-18 september
    - Karlsruhe workshop 26-17 October

- Status:
    - Significant progress made by all three technical teams working together to improve and compare the various modeling tools using standard tests and benchmarks. (see next slide)
    - Next gathering at Prague week Nov 23rd
    - First draft exists (based on L'Aquila status), discussion and update from KIT workshop planned for this week but is delayed.

- Final draft still expected by end of this month for circulation to ET-PP coordinator and EB

***T1.5a: Gravity integral: simple tests***

- What method is used to obtain the gravity fluctuation from the seismic displacement?
- Has the impulse response been validated for a homogeneous half-space model with a vertical surface force at 2 km horizontally from the surface point above a 250m deep test mass? The verification model needs to be 6km x 6km x 3 km, and the test mass needs to be located at the center of a spherical cavity with a 20m radius. The comparison between analytical and numerical models is carried out in terms of Fourier amplitudes. Parameters: 2700kg/m^3, alpha=5000m/s, beta=3000m/s, Qp=300, Qs=150.
- Was a gravity time series provided based on the model in the previous case, but with an additional horizontal layer at 50m depth? Surface layer: 2500kg/m^3, alpha=2000m/s, beta=1000m/s, [Qp=100, Qs=50] @ 5Hz.

**Updates from Karlsruhe (KIT) meeting:**

**[Follow the parameters and settings above, validation should be done before Annual meeting, 23.11.2026.**

**Tools: SeisNN, pySeisNN1D, SalvusNN, Newtonforge, ANNA+EDT, GMSHDDM**

**Requirements: short report should be provided on how do you do meshing and simulation.**

**Validation results (On Gitlab): Source time function, gravitational acceleration at 3 directions.The dt for the two data can be different. The comparison should be done between 3-10Hz.]**

**T1.6: *Documentation of how to run the full simulation***

- Is the documentation accessible by the ET collaboration on the TDS?

Links:

SeisNN: https://gitlab.et-gw.eu/shi.yao/newtonian-noise-models

Can the simulation indeed be run by someone outside the developer team with the instructions?

**How to validate: the developer should provide full documentation and the one validating should run the 2 examples [T1.5a] from the tool and reproduce the same result.**

**PySeisNN1D: Luqian Jiang**

**SeisNN: Hadrien Michel**

**SalvusNN: Shi Yao [After mondaic releases the new version]**

**Newtonforge: Soumen Koley**

**ANNA+EDT: Mohamed Samy**

**GMSHDDM: Stijn François**

**should be done before 23.12.2026.**

**T1.7: *Comparison with seismic observations***

- The simulated median reproduces horizontal and vertical seismic spectra in the 3-10 Hz band measured at the borehole underground and at the surface to **within PP40-PP60 range – discussion to be followed up in Annual meeting.** Once we have the first Newtonian noise estimate, we can reassess the error bounds. One plot should show the ratios of surface and underground amplitudes for each of the three displacement directions. The PSD from site selection criteria should be used.

**If you can fit the PSD with a set of models and sources with different parameters, then you should also have the NN range regarding the set of models. All the assumptions and the choices of parameters for fitting should also be stated clearly.**

Does the simulation reproduce any other known properties of the seismic field at the borehole location? Which ones?

## Deliverable D4.4 Update:

- Documents current 3D geological and hydrological models developed for the candidate sites using a common framework.
- Early October draft document consolidated by the technical teams and approved by the three consortia.
- Oct 12th draft sent to ET-PP coordinator and EB for review.
- Oct 23rd received review by ETO, ET-PP coordinator and CERN experts.
- This week: Review to be discussed for revision to final version (delayed)
- Final version expected end of Nov. for submission to the ET-PP EU committee.




Preparatory Phase for the Einstein Telescope Gravitational Wave Observatory

**Deliverable D4.4**

First 3D geology, hydrology, etc. model with approximated localisations of the ET

Lead beneficiary: NIKHEF
Delivery Date:
Dissemination level: public
Name: ET-PP-Deliverable-4.4
Version: 1.0

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IFAE Institut de Física d'Altes Energies

21 October 2026

**Review of Deliverable D4.4 – *First 3D geology, hydrology, etc. model with approximated localisations of the ET***

Dear ET-PP WP4 Coordinators, dear ETO representatives,

This document is intended as a first-pass review of the ET-PP WP4 Deliverable D4.4 as performed by ETO and ET-PP Coordinator in consultation with experts at CERN.

**1. Overall assessment**

Deliverable D4.4 provides a useful overview of the state of the art of 3D subsurface modelling at the three sites. It presents information on the current status of the models and establishes a framework for describing their respective characteristics and development.

However, the document would benefit from substantial revision to strengthen its coherence, clarify its purpose, and improve its usefulness to the intended audience, particularly the European Commission (EC). Although the three site-specific contributions provide relevant information, their differences in content, structure, and level of detail make it difficult to identify common findings, compare the maturity of the models, or draw conclusions at the level of the deliverable as a whole.

The main recommendation is to strengthen the document's overarching narrative and comparative dimension. D4.4 should not only describe the status of the three sites but also explain the significance of the findings, identify commonalities and differences, and clarify the implications for the objectives of the project.

**Deliverable 4.5 Update:**

- Site Selection Criteria Document - Conclusions of the Site Selection Criteria Committee, SiSeC)
- **See Andrew's presentation today on recommendations for criteria and process**
- Report delivered to BGR mid October
- Approval expected early December