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New geological and hydrogeological insights from public tender investigations at Sos Enattos for the Einstein Telescope configurations L and T.

Recent deliverables from RockSoil S.p.A. have significantly advanced our geological and hydrogeological understanding of the Sos Enattos area, which is being considered as a potential location for the Einstein Telescope (ET). The dataset includes results from eleven deep boreholes, geophysical surveys (ERT and SRT) and magnetometry and radon gas measurements. These results have been integrated across both the L-shaped and triangular (T) configurations of the underground infrastructure.

The geological framework, supported by detailed cartographic outputs at a scale of 1:10,000 and stratigraphic logs of unparalleled detail, is consistent with previous boreholes drilled in the area and confirms the predominance of Palaeozoic crystalline basement units (granites, gneisses, micaschists and phyllites) in the projected tunnel areas. Both fieldwork and subsurface exploration support the idea that localised brittle fault zones of limited extension influence both lithological variability and geomechanical behaviour. While the regional model aligns with prior knowledge, new fault-related features and small-scale heterogeneities have been identified.

Hydrogeological analyses based on 54 Lugeon tests and flow modelling reveal low primary porosity and fracture-controlled permeability. Estimated drainage rates differ between configurations, with higher cumulative flows in the L setup (80–100 L/s) than in the T setup (60–75 L/s). However, the current piezometric network, which is limited to deep filters, restricts the vertical resolution of hydraulic gradients and potential interactions with shallow water resources.

These findings provide a robust basis for pre-feasibility assessments and future 3D geological modelling. Nevertheless, additional shallow investigations, multi-level piezometry and hydraulic testing are critical to fully characterising subsurface conditions and optimising design parameters for the ET infrastructure.

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