

Civil and environmental engineering activities for the ET sustainable design in Sardinia

The civil and environmental engineering activities for the ET sustainable design in Sardinia are quite comprehensive and focused on ensuring optimal placement, environmental sustainability, and operational efficiency of the underground and surface research infrastructure. To facilitate comprehensive environmental and structural assessments, key activities include the utilization of high-resolution geomatic techniques, such as terrestrial and UAV Lidar surveying, satellite Earth Observation analysis and topographical and gravimetric airborne surveying.

In this framework, the first goal is the establishment of a first order geodetic network in support of the definition of the ET Reference System. In parallel the simulation of the future high-precision reference surface and underground geodetic network to facilitate the positioning of functional components within the facility, will be carried out. Secondly, the implementation of a 3D GIS-BIM, that integrates geographic information and infrastructure design data, will support the optimization design solutions and the decision-making processes for infrastructure localization. Geotechnical investigation will be adopted to identify potential interferences to support the multi-criteria analysis tool in relation to the estimation of the underground excavation works and to the design of monitoring systems. In addition, innovative methodologies for managing and reusing the excavation material will be analysed to minimize environmental impact. Finally, the activity is contributing to the development of a hydrological model of the area to identify the main hydrogeological units, hydraulic characteristics, aquifers, and groundwater circulation model, with a focus on designing a collection and drainage system for potential infiltration water to preserve the infrastructures.

The crucial aim is to incorporate advanced technologies, interdisciplinary teamwork, and sustainable methods to effectively establish the ET facility while reducing its environmental footprint. As a result, a cooperative initiative was undertaken across multiple engineering fields, such as renewable energies and intelligent transportation, to outline a resilient energy and transportation system for the ET infrastructure and its vicinity.

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