



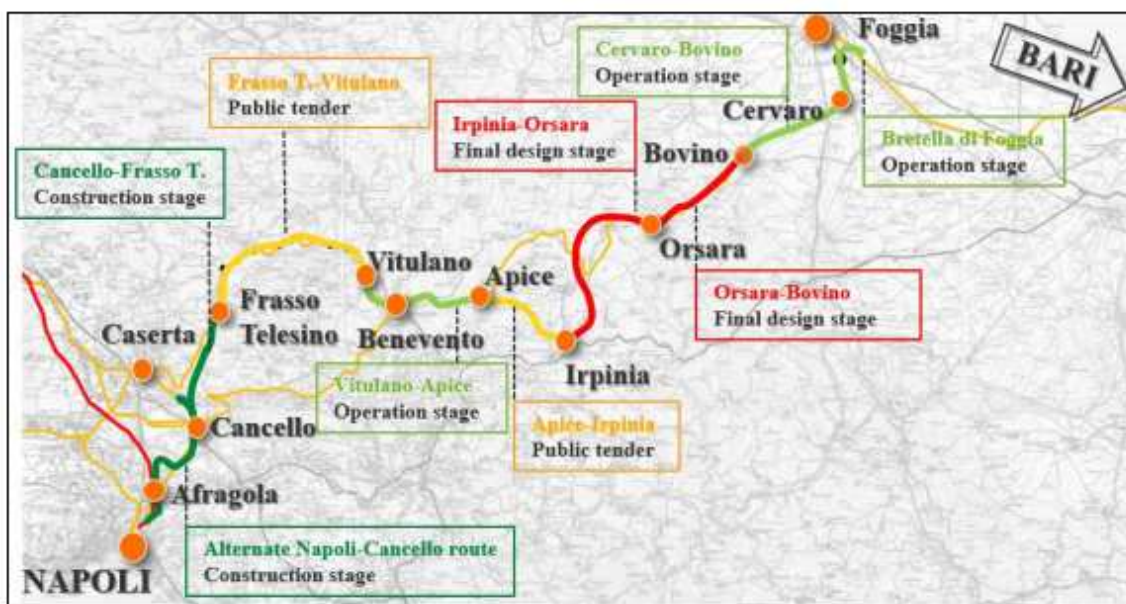
## Geological and geotechnical key-factors for tunnel design of the new Naples-Bari High-Speed railway line in Southern Italy

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The Naples-Bari High-Speed (HS) railway line is part of Trans-European Scandinavian-Mediterranean Corridor (Helsinki-La Valletta). The line has a double track configuration and a total length of 300 km, of which 120 km in design or construction stage, including about 68 km of underground works. The contract volume is about 6 billion euros and the line will be activated in 2026.

The new line has a length of about 180 km from Naples to Foggia and is divided into 9 sections. Hirpinia - Orsara section has most long tunnel, named "Hirpinia", with a length of about 27 km, a twin single-track configuration and provided of an underground safety area.



Naples-Bari HS railway line - project sections

### GEOMORPHOLOGICAL FACTORS

The line crosses a region with a high susceptibility to landslides that have been also investigated by means of satellite radar monitoring, using the SqueeSAR™. A proper

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geotechnical instrumentation has been implemented for critical phenomena and also the underground alignment has been considered the most effective solution, under-passing the critical areas of unstable slopes, to mitigate the landslide risk.

### GEOTECHNICAL FACTORS

The tunnels cross, under variable conditions of coverage, several different geotechnical units, ranging from rock-masses, to clay and clay shales. A particular attention has been paid to the characterization of the so-called 'Argille Scagliose' geotechnical unit for which the results of investigations have been shown a peculiar mechanical behaviour and low strength parameters. These aspects have showed the difficult to predicting the behaviour of these formations during excavation. Analytical or numerical modelling provided a support for the prediction of the ground mass response.

### MAIN CRITERIA FOR TUNNEL DESIGN

Analytical and numerical modelling showed that a peculiar typology of Tunnel Boring Machine (closed EPB shield machine) appears to be appropriate under low overburden or when the ground behaviour has been evaluated very complicated. Conventional drill & blast method is adopted for the excavation through 'Argille Scagliose' Unit under high depth.



Hirpinia-Orsara section – Geomorphological map and typical landscape in clay slopes

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