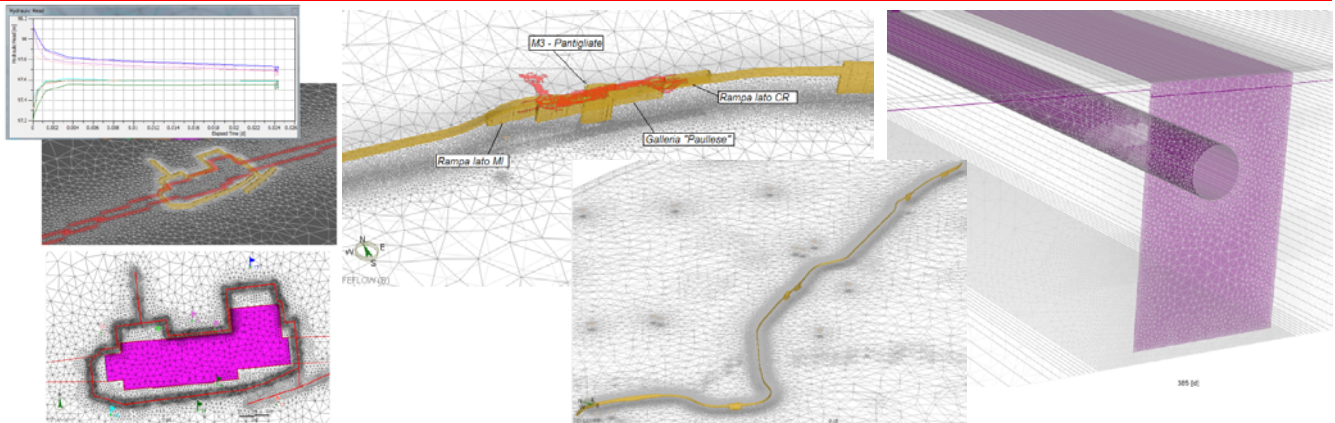


Localization: Line "M3" of Milan underground, Milan

Client: MM - Metropolitana Milanese



Description

FEFLOW has been used to support the project of the new metro line M3 in the eastern metropolitan area of Milan. The new line, 6.5 km long, will be totally underground and under the phreatic level, within an high permeability alluvial aquifer, around 40 m deep. Five underground stations will be realized along the metro line, with foundations almost reaching the base of the aquifer. Several 3D models has been realized, both with horizontal and vertical layers, for different scale evaluations.

The aim of the models, as requested by local Environmental Authority (ARPA), is the evaluation of the "barrier effect", leading to permanent water level rise behind the line, in an urban area where the levels are already very close to underground structures.

The model had also to assess the impact on the fountain lines, representing natural water outcrops due to the decrease of permeability in the lower part of the plain, widely used to supply the agricultural channels net.

The model has also been applied, at an increased detail level, within the "critical" zones of the line, for the project of drainage trenches leading to the reduction of groundwater flow impact.

Detailed transient input data were available mainly from a previous MIKE SHE water balance model, realized by DHI Italy to support both the public water resource exploitation and the control of the water level rise in the whole metropolitan area,

mainly due to the reduction of groundwater pumping for industrial use. Input data from MIKE SHE included calculated 1 day step recharge from rainfall and irrigation, leakage to deep aquifers, water levels both in Lambro river and main unpaved agricultural channels.

The detailed model implementation required additional stratigraphic and hydrodynamic investigations (soundholes, multi-well tracers tests, pumping tests).