# Application of HPT/EC Tools for Assessment of the Distribution of Permeability in Excavation and Drawdown Target Area

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**Background/Objectives.** In an old industrial site in the State of São Paulo, environmental investigations showed the presence of a landfill of miscellaneous waste (wood, plastic and clay-matrix pigments), in an area of approximately 1000 $m^2$ and average depth of 4 m. This landfill is on an alluvial stratum composed of coarse sand and cuttings, of about 0.5 m thickness. Below that, there is a clayey saprolite, rich in mica. The local water level is approximately 0.5 m deep. The landfill at stake was deemed to be a source of contamination for groundwater and, after study of remediation alternatives, the excavation and disposal technique was applied. Considering that, currently, most of the profile to be excavated is in a saturated zone, a study was necessary for better understanding the distribution of permeability, aiming at the future sizing of the drawdown system to be implemented.

**Approach/Activities.** For assessment of the three-dimensional distribution of permeability, high-resolution HPT and EC tools were used. The study contemplated five drillings, with average depth of 6 m. For verification of high-resolution data, three baildown tests were performed. To support the interpretation of information assessed, data from SPT tests previously performed were used.

**Results/Lessons Learned.** SPT tests indicated that the landfill layer at stake is hardly compact, providing low resistance to penetration. Such fact may reflect significant empty spaces, which may also explain the high variability of EC measures, which showed clear negative correlation with HPT data (K estimates). In this scenario, portions with high K values estimated by means of HPT are plausible (maximum values higher than 40 m/day), which promoted dissipated tests of which balances were achieved in less than 1 minute. In the alluvial stratum below the landfill there were consistent EC and HPT responses, with average K of about 15 m/day. In the weathered rock zone, the negative correlation between EC and HPT measures (K estimates) lost strength, mainly due to the EC results below those expected for clayey materials (average around 20 mS/m). The significant presence of mica is believed to explain such results, given the insulating characteristics of this mineral. The bail down test results confirmed the K intervals estimated by the HPT tool. Therefore, high-resolution information was applied for drawdown calculation, which indicated that in its peak moment, drawdown flow rate may reach 30 m3/h. Thus, it may be said that the high-resolution tools were a quick and low-cost method for characterization/definition of assumptions relevant for drafting of a reliable intervention plan, as they could identify the variability of permeability hardly noticeable by traditional methods, pursuant to the same scales of time of execution and investment.