



Updating of the Conceptual Model of a Former Industrial Waste Disposal Area Using High Resolution Tools

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Speakers: Mariana Quesado and Rizia Aguiar

Special Guest: Rosialine Roedel



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AGENDA

Introduction

Goal

Activities

Results

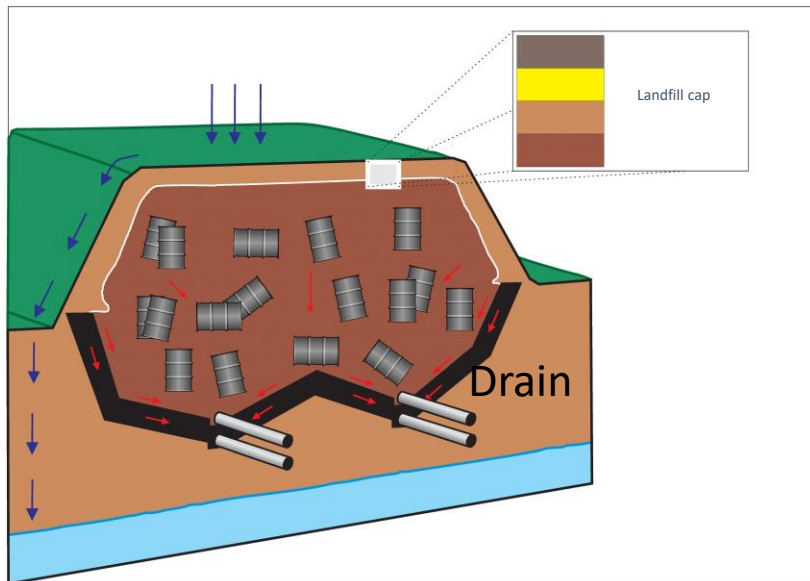
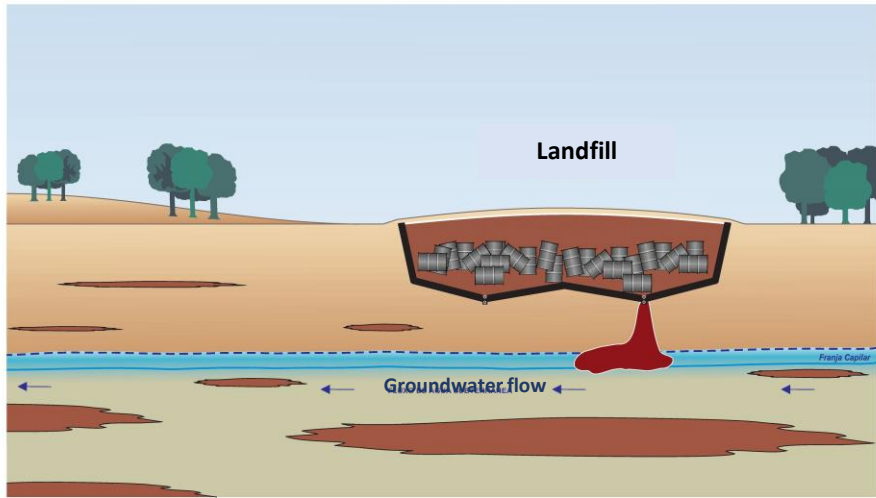
Conclusions



Agenda!



INTRODUCTION



Waste storage

Often used in 80's

The study applies to industrial waste

Deposited until 1993

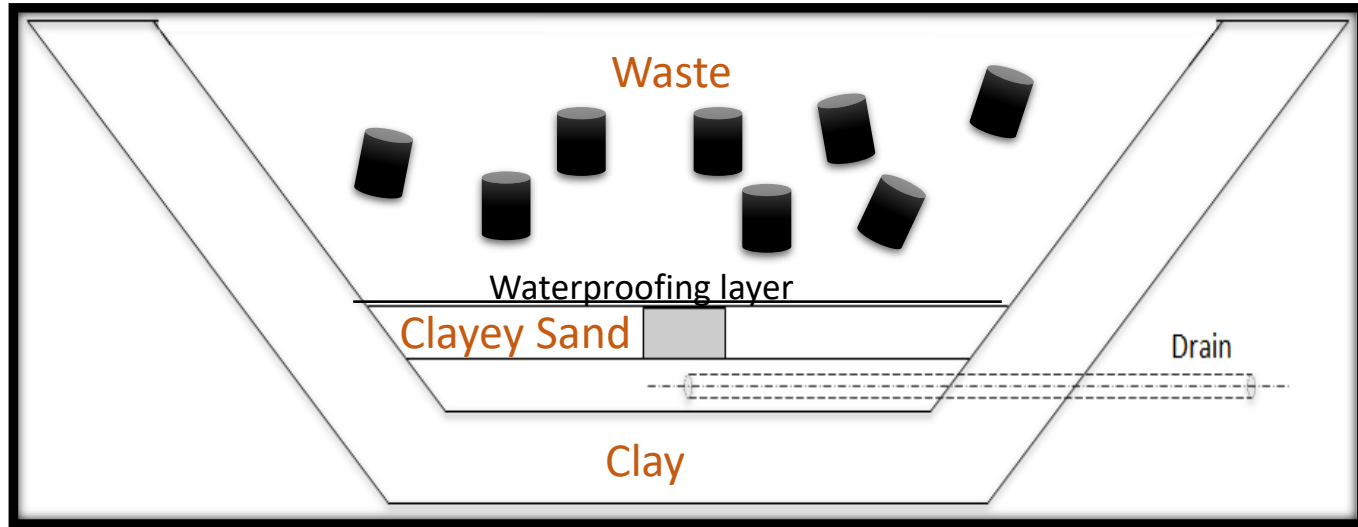
Organic and inorganic composition

- Characteristics of concentrations of LNAPL and DNAPL when present in groundwater

INTRODUCTION

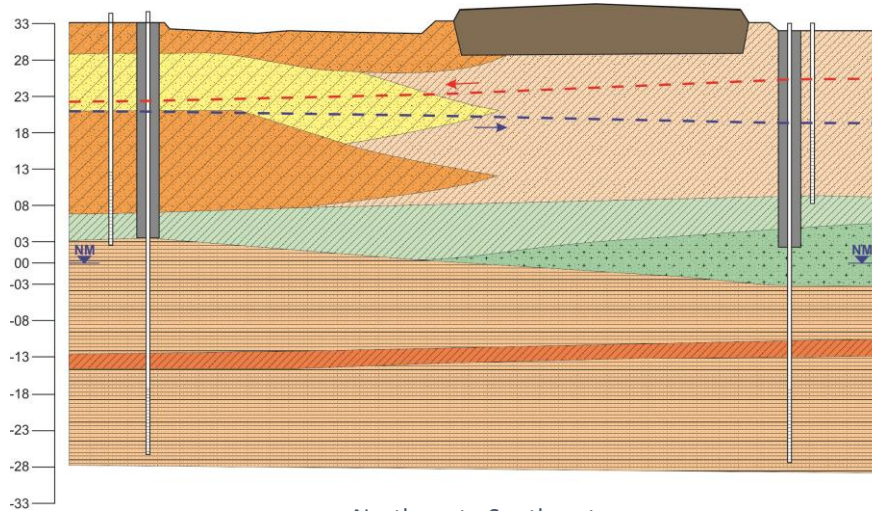
There was found leachate infiltration in some alarm drains.

Leachate drain units and alarm drain was installed to verify possible leaks due to the non-efficiency of the built waterproofing layer.

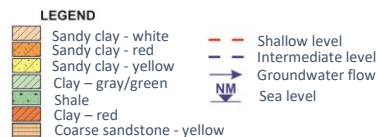
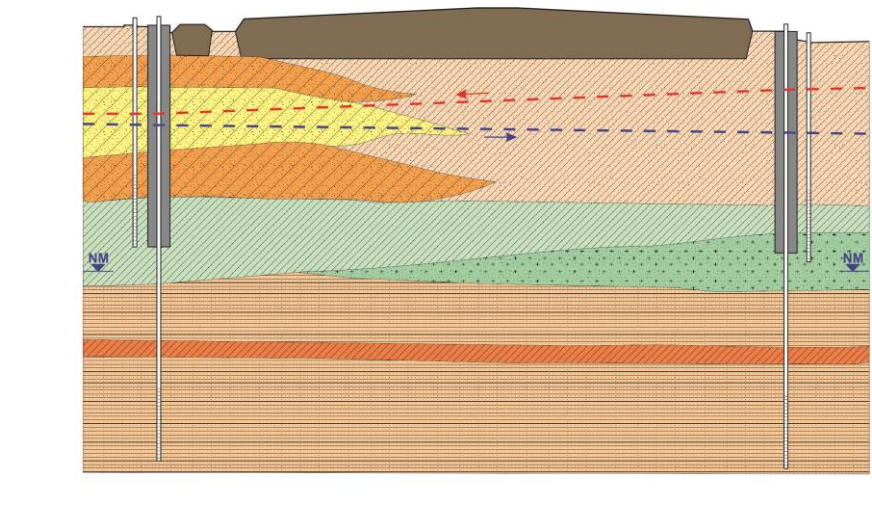


INTRODUCTION

Northeast - Southwest



Northwest - Southeast



Hydrogeological Conceptual Model

1# LAYER

Heterogeneous and unconsolidated sediments – when not covered;

2# LAYER

Sandy clays predominate in the shallowest parts (until 25.0m);

3# LAYER

Clay layers intersect sandy clays, at depths of 3.0m (NE), up to 11.0m (SE);

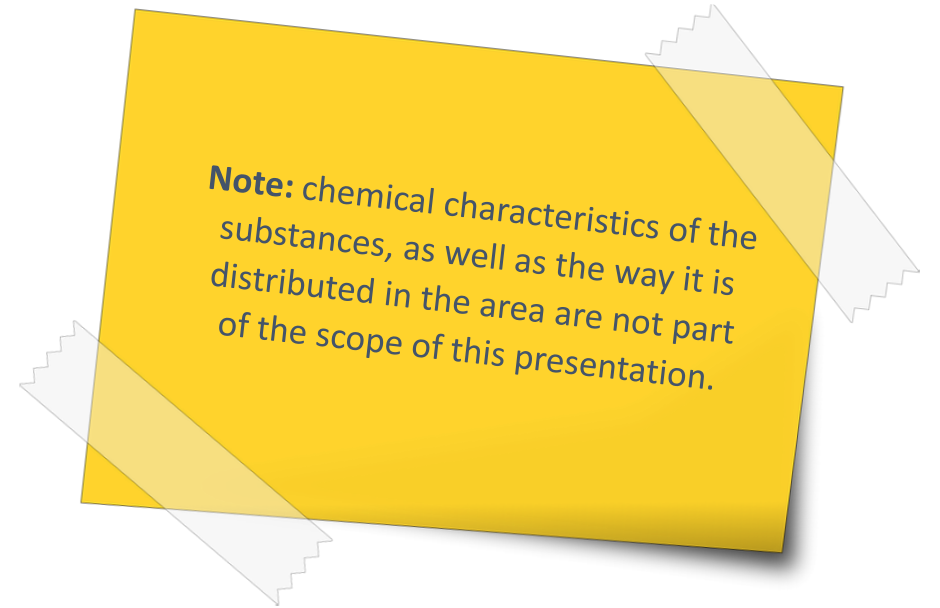
4# LAYER

From 30.0m there are sandstones, with intercalations of clay layers, with a thickness of just over 2.0m in the upper portion and increasing in expressiveness with depth;

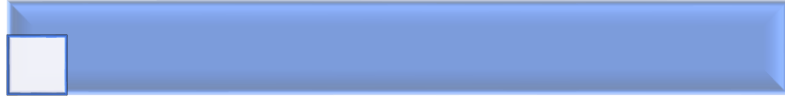
In general, the groundwater flow follows in the direction of surface drains, being strongly influenced by local recharge, of a seasonal character, by the complex inter-typing of layers and potentiometric relationships with deeper aquifer levels.



The study aimed to update the hydrogeological conceptual model through environmental investigations using High-Resolution tools to identify lithological profiles with the highest potential for transporting and retaining contaminants in a former industrial waste disposal area.



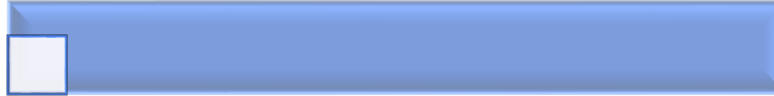
Geophysical Electroresistance Surveys



- 06 geoelectric lines;
- “Dipole-Dipole” array.



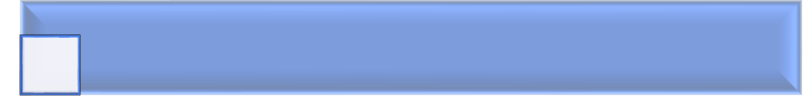
Piezocone CPTu



- Direct underground investigation method that maps vertical contacts between horizons of greater or lesser hydraulic conductivity;
- 27 surveys were carried out to carry out Piezocone Tests (CPTu).



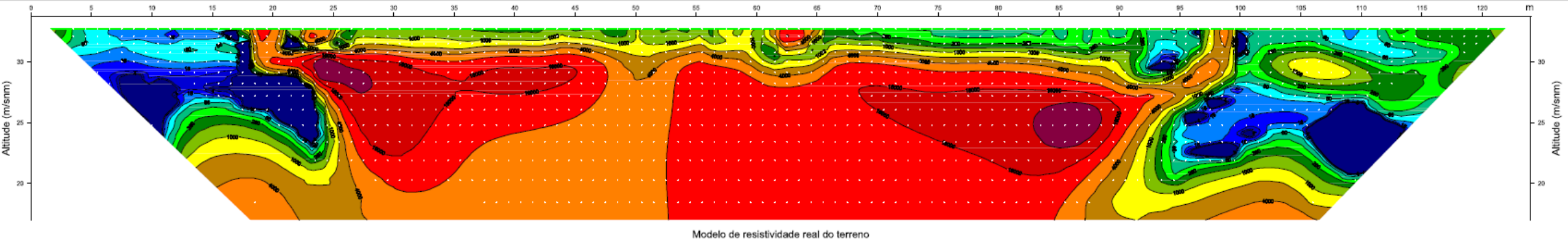
Full Profile Soil Sampling



- 20 points of Full Profile Soil Sampling were performed, using tubular polyethylene samplers (liners) stacked through “Direct Push” method.

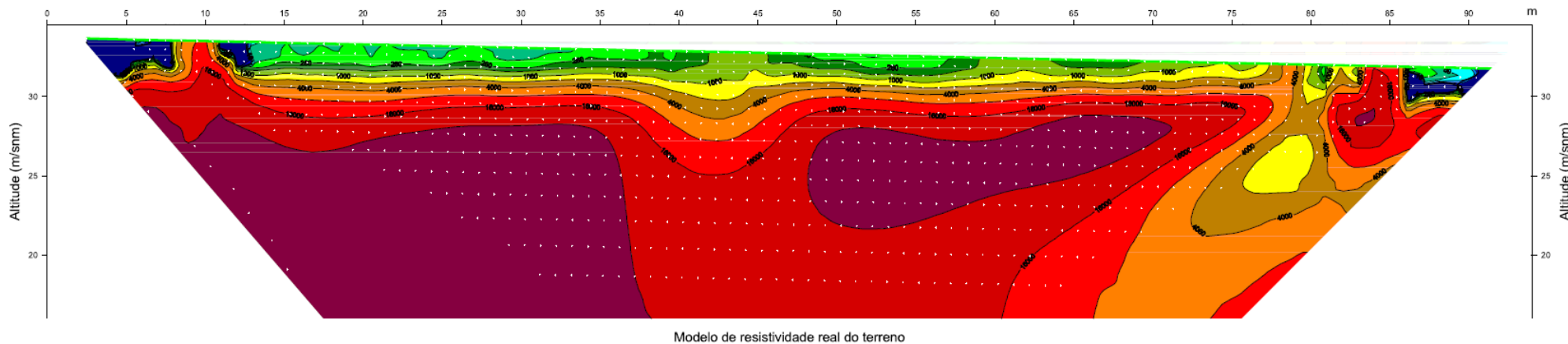


RESULTS



The set of techniques used identified the priority areas with the presence of geophysical anomalies, the survey results indicated lateral discontinuities in the distribution of electrical resistivity in one or more depths in the subsurface, possibly caused by leachate percolation, indicating as an area for potential source of contamination.

As for the region above the ditches, the geophysical method by electroresistance was not able to overcome the waterproofing layer.





Lithostratigraphic Units:

1.
Backfill:

- 0 à 11 m, sands, silts and clays, higher heterogeneity.

2. Grey light
sandy silt

- 11 – 14m depth.

3. Grey
light silty
sand:

- 12 – 17m depth.

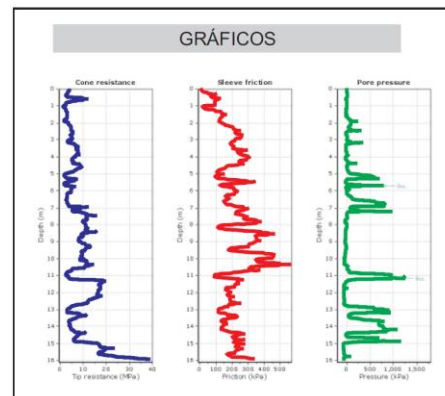
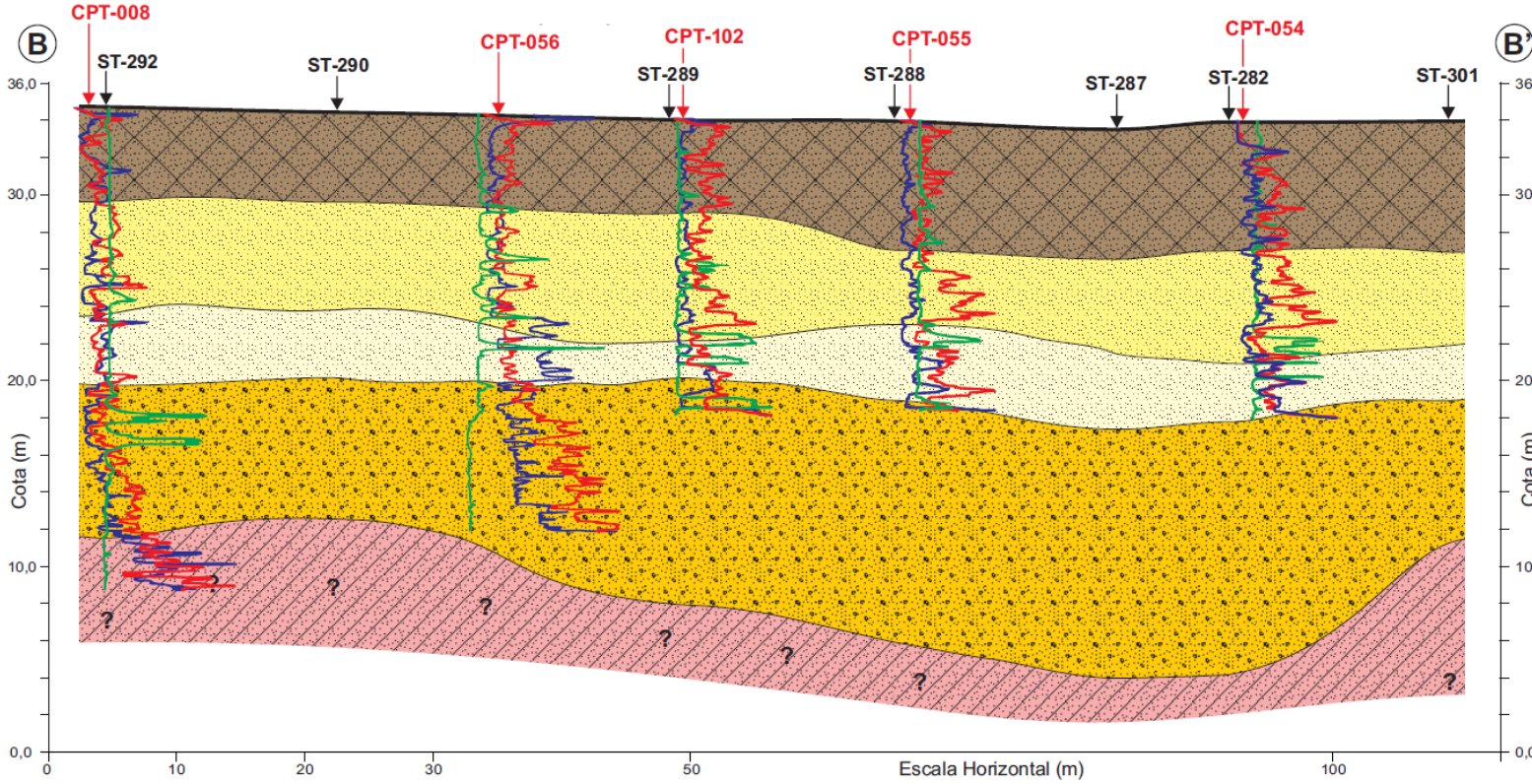
4. Grey light
sandy silt:

- 15 – 31m depth, presence of quartz pebbles.

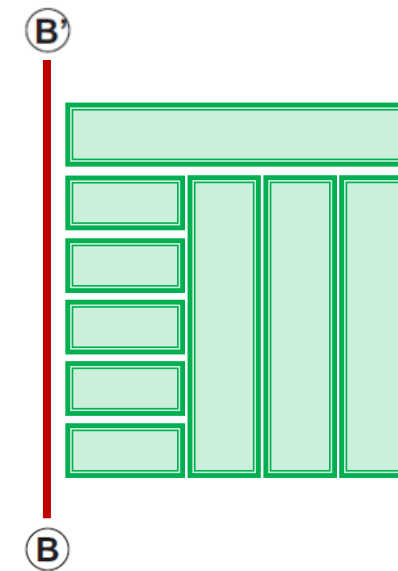
5. Yellow
light clayey
sand:

- 24 – 32m depth, presence of quartz pebbles.

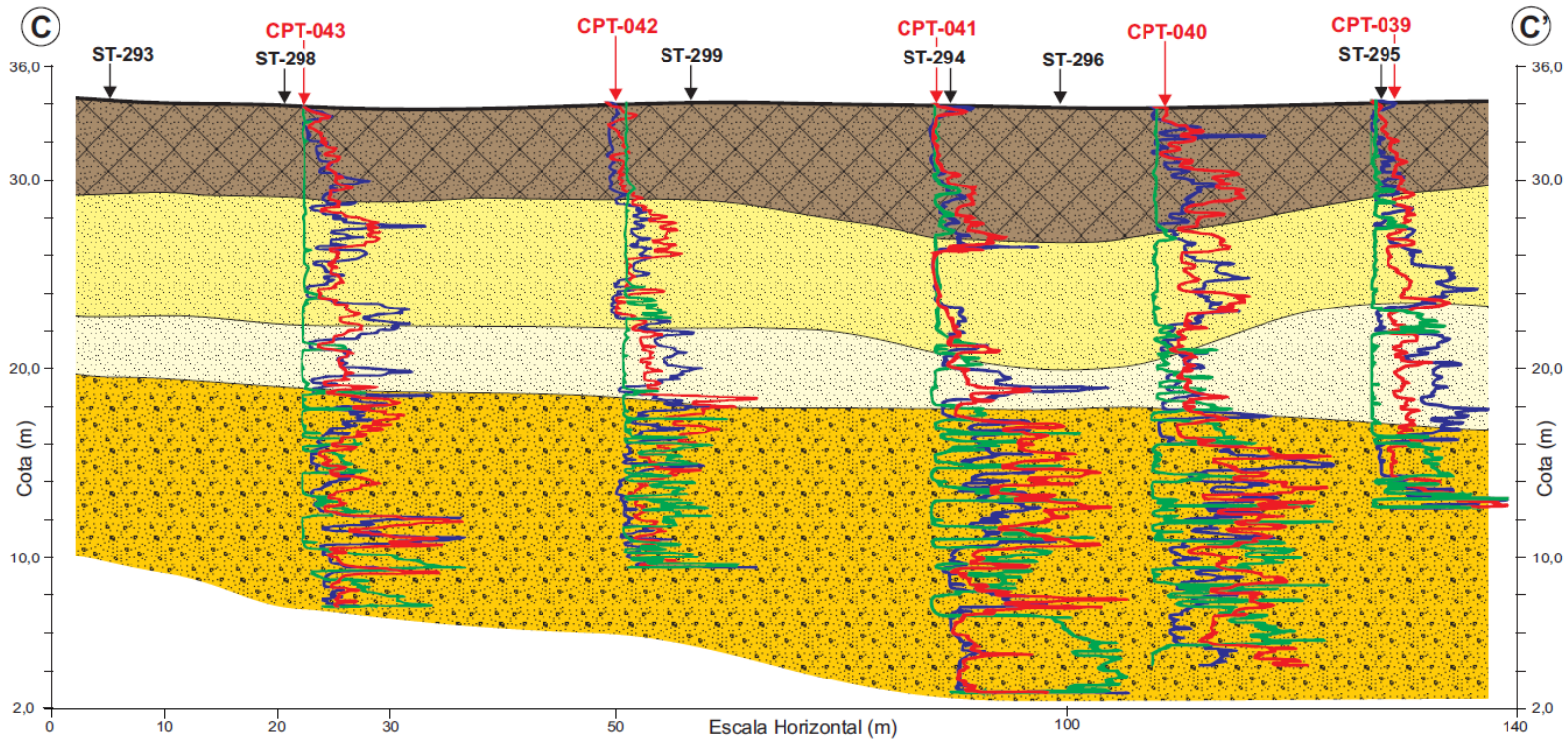
RESULTS



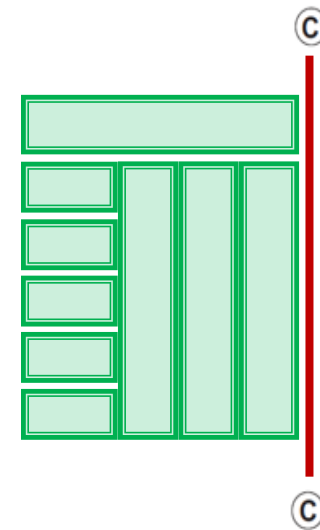
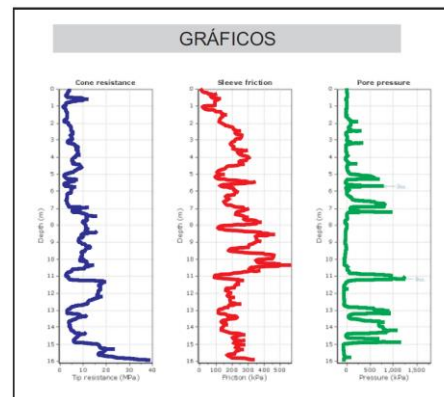
Sandy silt layer was the layer with the highest potential to transport of contaminants mass - 11 to 14 meters, presenting fine to medium granulometry.



RESULTS



Sandy silt with quartz and conglomeratic clay sand were the layers that most have the heterogeneous hydrogeological behavior - 15 to 32 meters.



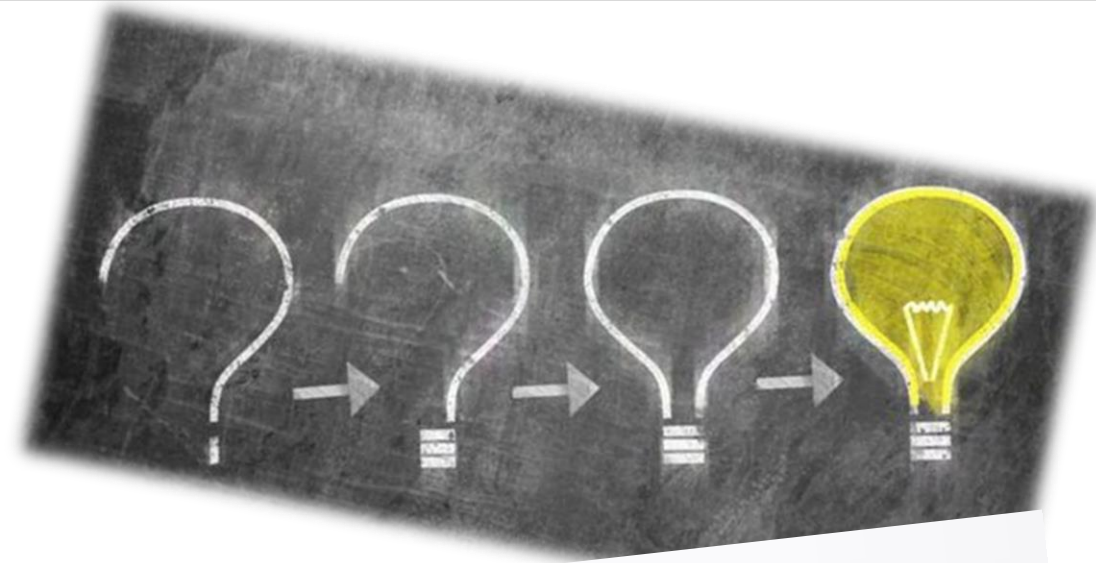
CONCLUSIONS

CPTU tests contributed to refine the hydro-stratigraphic model, allowing greater precision in the descriptions of profiles on a centimeter scale.

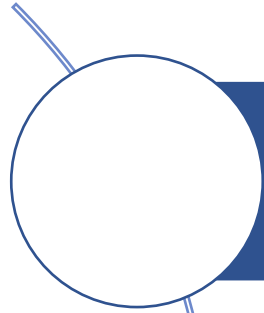
The CPTU profiling method showed limitation of drilling progress in regions where gravel layers occur;

The descriptions of soil samples from the Direct Push method allowed to interpret in detail the geology of the studied area, mapping layers of low hydraulic conductivity (silts and clays) and high conductivity (silty sand).

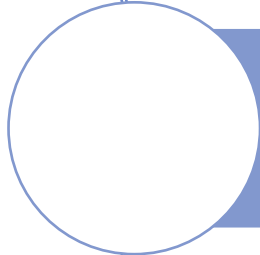
The geophysical survey by electroresistance indicated suspicious areas for refinement of investigations of potential leakage of the ditches. On the other hand, in other areas, where no anomalies were found, good integrity of the drains that make up the organic valleys was inferred.



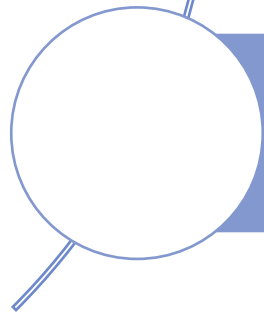
CONCLUSIONS



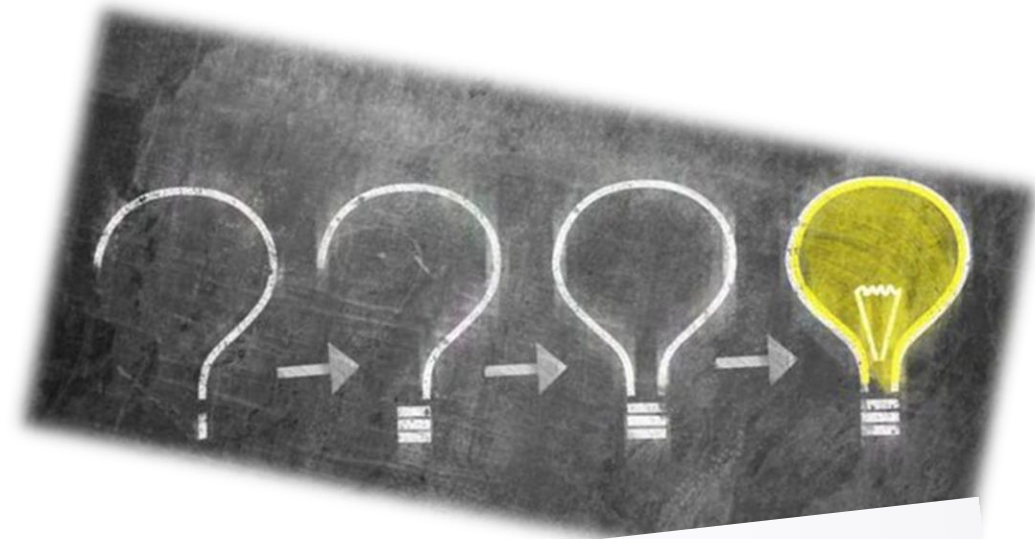
The combination of the tools used allowed the construction of the hydrogeological conceptual model of the area in high resolution, with 05 predominant geological layers being identified.



The sandy silt and clayey sand lithologies found in the study area have conglomeratic characteristics, indicating varied hydrodynamic behavior regarding the storage and transport of contaminants;



The deeper layers (below 30 m) need more detailing.



Thank you for the opportunity and attention



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