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FACULTY OF SCIENCES

DEPARTMENT GEOLOGY
HYDROGEOLOGY AND APPLIED GEOLOGY

GROUNDWATER MODELLING

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PROJECT

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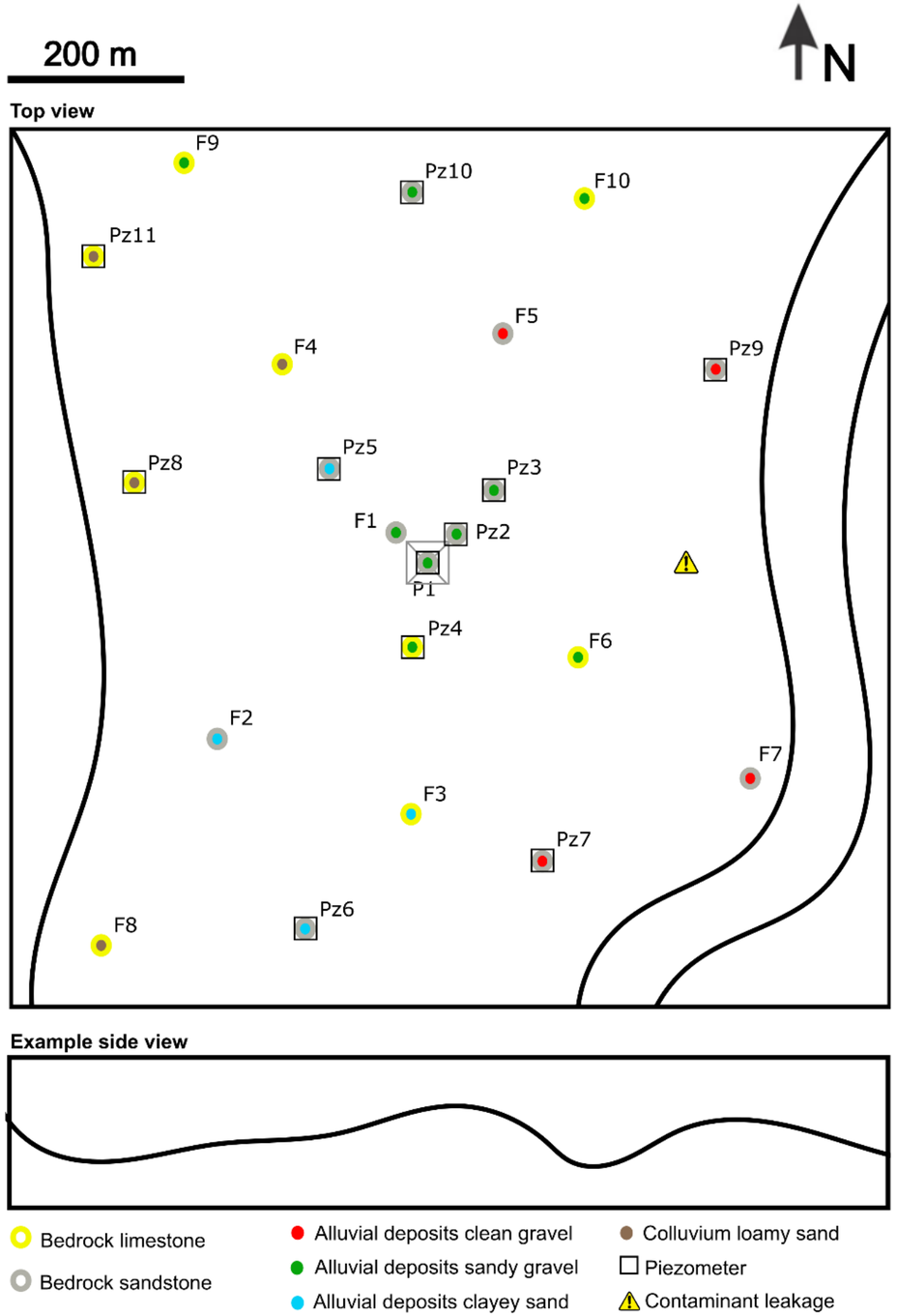
CONTEXT

Alluvial aquifer next to a river

Thickness: 7 to 21 m

Lying above a bedrock aquifer

Pumping well in the alluvial deposits



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OBJECTIVE

1) calculate the flowrate that is required to deplete the pit of water

2) calculate the time it takes to make the pit dry at that flowrate

3) roughly estimate if a continuous contaminant leakage present at the surface +/- 300m east of the pit will enter the pit during the construction works.

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PROJECT WORKFLOW

Set up model

- Conceptual model
- Steady state calibration in natural and pumping conditions (hydraulic conductivity)
- Transient calibration in pumping conditions (specific yield and specific storage)
- Transport calibration (not for SULAMA) (porosity and longitudinal dispersivity)

  →what is the effect of dispersion
- Sensitivity analysis

Solve problem

- Estimate minimum flowrate (is there a way to decrease this?)
- Estimate time
- Contaminant leakage in natural conditions and pumping (pit flowrate) conditions.
  - What do you think the influence would be if you did a full transport simulation (not for SULAMA)
  - What is the influence of porosity?

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DATA

Geological and hydrogeological context

Information about the river and the recharge

Natural and pumping conditions: steady-state hydraulic head measured in 12 piezometers

Table 2	*Flow condition*	
	h natural (m)	*h pumping(m)*
P1	37.21	35.09
Pz2	37.20	36.34
Pz3	37.19	36.58
Pz4	37.22	36.53
Pz5	37.30	36.70
Pz6	37.42	36.95
Pz7	37.21	36.84
Pz8	37.46	37.00
Pz9	37.15	36.80
Pz10	37.23	36.83
Pz11	37.41	36.97
Pz12	37.22	36.45

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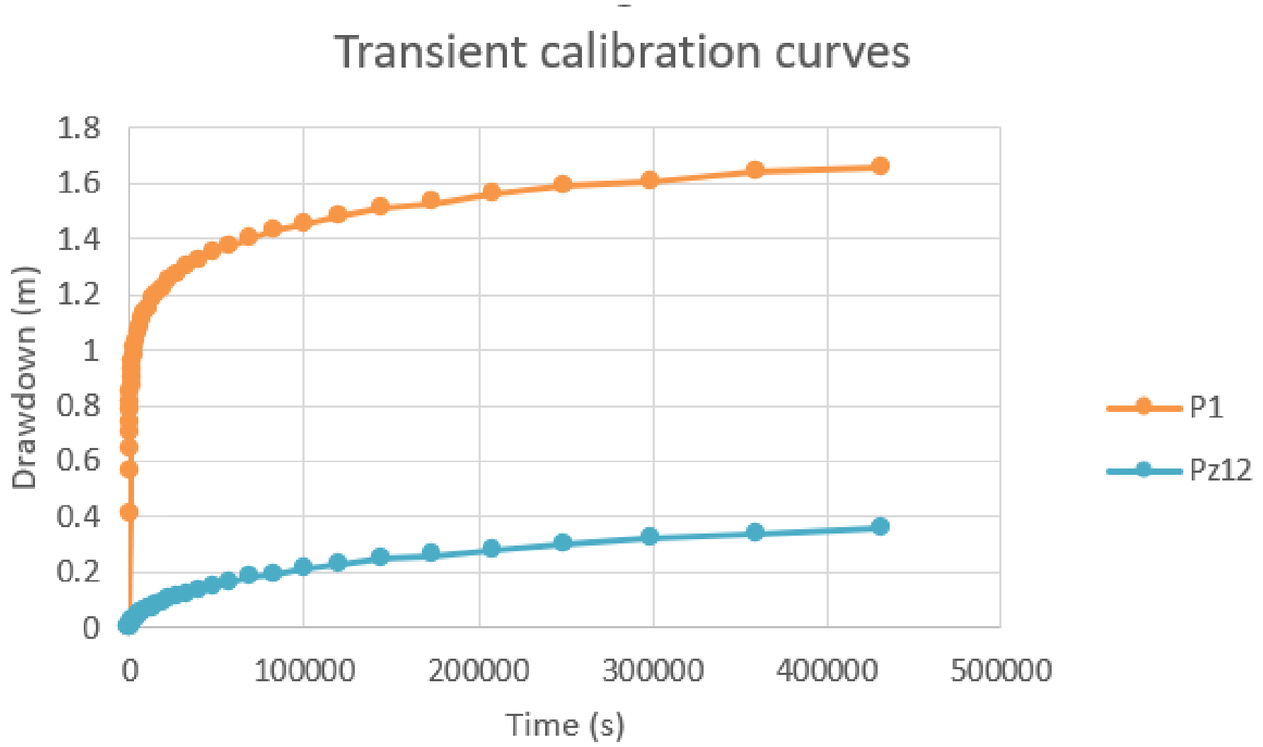
DATA

Transient data of the drawdown in the pumping well (both aquifers) during pumping



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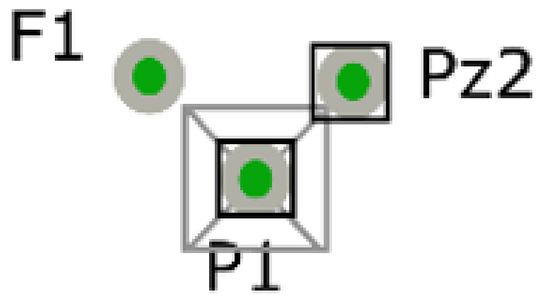
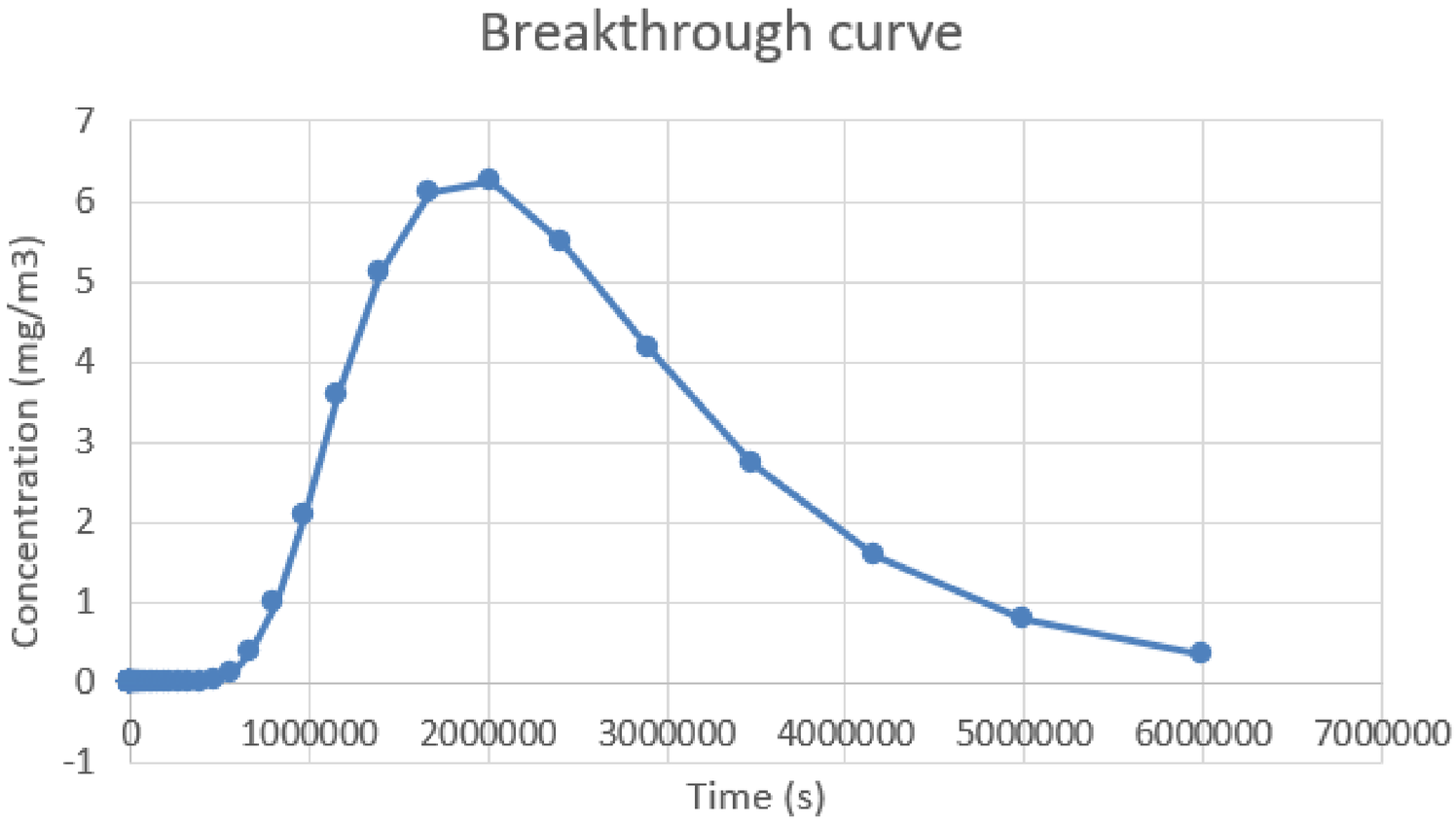
DATA

Tracer test between neighboring piezometer (Pz2) and pumping well (P1)





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METHODOLOGY + PLANNING

1) Introduction to Model Muse with introductory exercice (27/09)

2) Conceptual model (modeling choice, boundary conditions) + Model implementation (2/10 – 4/10)

3) Milestone on 9/10: checking the conceptual model and the model impementation

4) Steady-state calibration in natural and pumping conditions to derive the hydraulic conductivity distribution (4/10 + 09/10 + 11/10) **= Most time-consuming task**

!!! Working on your model during the practical sessions is not sufficient, make sure to make some progress home to stay on tracks !!!

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METHODOLOGY + PLANNING

5) Transient calibration in the well to derive the specific storage and specific yield (11/10)

6) Transport simulation to derive the effective porosity and dispersivity (16/10) → not for SULAMA students

7) Solving the problem (18/10) → effect of dispersion not for SULAMA

8) Additional session for finalization (23/10, 25/11)

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DEADLINE

Additional project Q&A session November 8 at 9 AM

Report expected on November 27

(follow the guidelines for the report on Ufora)

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