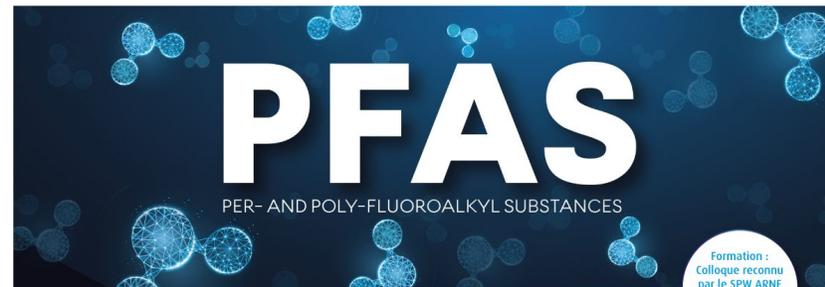


# PFAS flux to improve groundwater management and treatment

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3<sup>e</sup> Congrès International  
Gestion des Risques Environnementaux & Sanitaires

4, 5 & 6 juin 2024 - Paris

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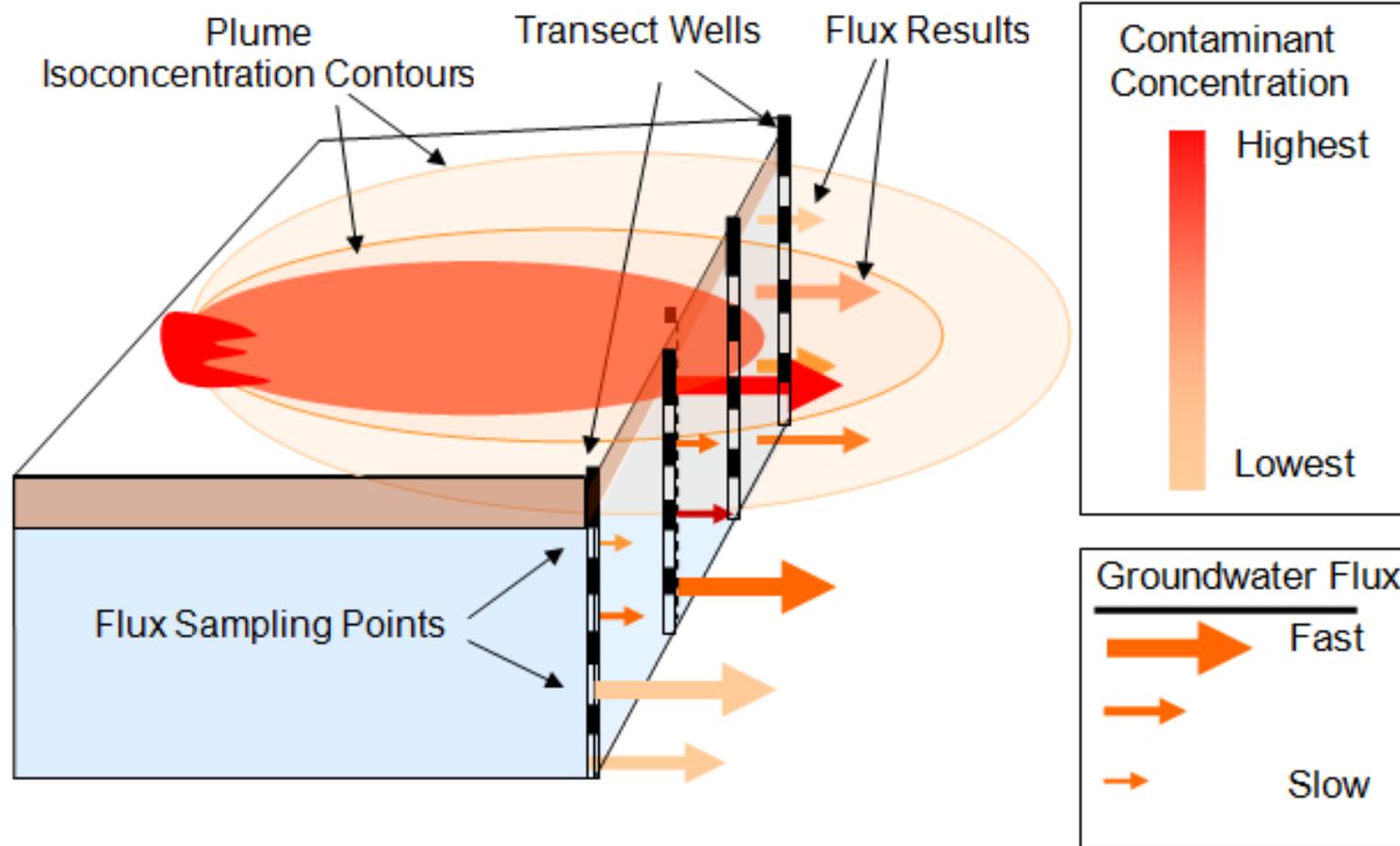
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**1**

# **Introduction: FLUX concept**

# Why: variation over time and space !

Groundwater flux vs PFAS mass flux



2

## PFAS validation of iFLUX

# PFAS validation of iFLUX

- Resins (sorbent matrix) and PFAS analyses (11 compounds)
  - **SGS validation → QUANTITATIVE results**
    - ✓ PFHxA
    - ✓ PFHpA
    - ✓ PFOA
    - ✓ PFNA
    - ✓ PFDA
    - ✓ PFUdA
    - ✓ PFDoA
    - ✓ PFBS
    - ✓ PFHxS
    - ✓ PFOS
    - ✓ PFOSA
  - **Without validation → QUALITATIVE results**
- PFAS analysis of production parts and installation equipment

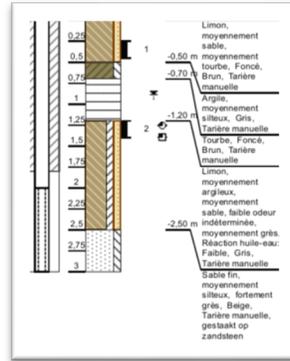
3

## Project preparation

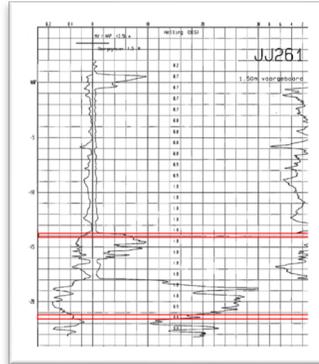
# Preparation: available data ?



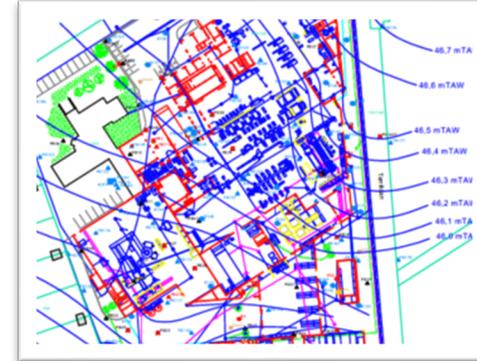
Location



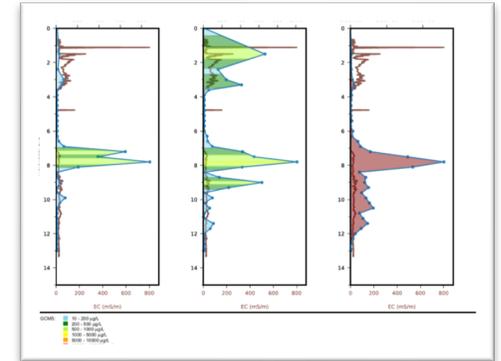
Logs



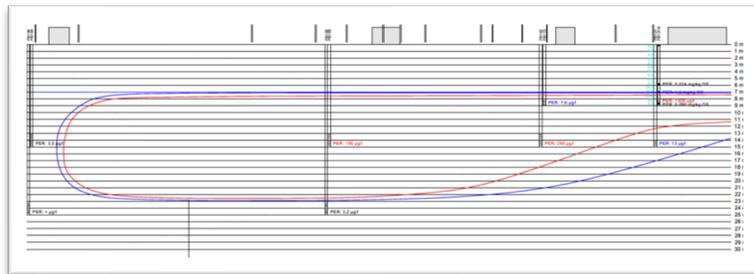
Soil probing



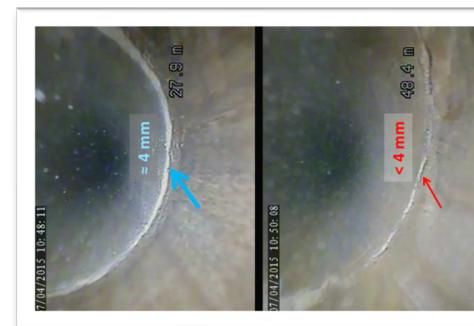
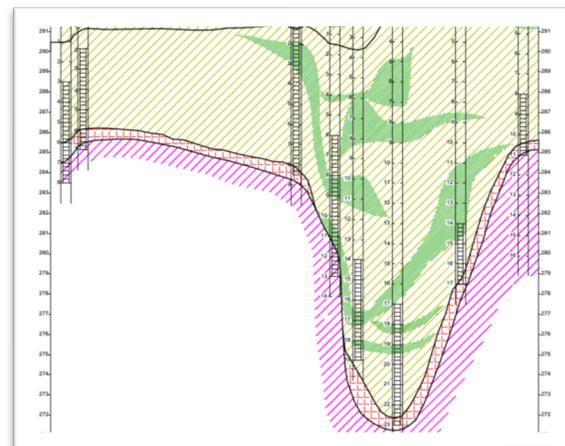
Isohyse



MIP



Transects



Video/Pictures

Parameters	U.M.	07/08/23	08/08/23	03/08/23	27/09/23	03/11/23
aluminium	µg/l Al	<10.0	<10.0	<10.0	<10.0	18.8
arsenic	µg/l As	53.5	32.8	47.2	78.5	20.6
cu	µg/l Fe	4.150	2.220	2.030	314	1.09
manganese	µg/l Mn	276	197	250	135	114
benzene	µg/l	10.5	5.6	4.9	0.88	0.66
toluene	µg/l	29.6	27.7	3.9	0.87	12
chloroethane	µg/l	-0.04	5.7	-0.04	-0.04	-0.04
chloroform	µg/l	1.8	19.000	0.088	0.041	7
vinyl chloride	µg/l	0.37	1.08	0.32	0.122	0.202
1,2-Dichloroethane	µg/l	0.38	5.4	0.135	0.06	0.055
trichloroethylene	µg/l	0.63	3.3	0.159	0.106	0.067
trans-1,2-dichloroethene	µg/l	0.067	0.32	0.065	0.052	-0.050
cis-1,2-dichloroethene	µg/l	6.5	4.3	0.96	0.199	0.47
2-Dichloropropane	µg/l	0.092	0.98	-0.010	-0.010	0.0134
2,3-Trichloropropane	µg/l	0.46	1.51	<0.00100	0.0085	<0.0010
trans-dichloroethane	µg/l	-0.017	-0.1	-0.017	-0.017	-0.017
chloroethane	µg/l	2.9	3.9	1.17	0.3	-0.08

Analysis results



# Preparation : installation plan



INSTALLATION	Date	2023-09-26 12:00	2023-09-25 12:00
Niv. Eau [m-sommet Pz]		8.25	2.71
Fond Pz [m-sommet Pz]	<input type="checkbox"/>	13.48	<input type="checkbox"/> 9.55
HF mesuré [m-réf]	<input type="checkbox"/>	0.48	<input type="checkbox"/> 0.55

RETRAIT	(Dernière) date	2023-10-19 12:00	2023-10-19 12:00
Niv. Eau [m-sommet Pz]		3.34	2.34

PzS10	MW12
4.0-13.0m-ref	1.5-9.0m-ref
Ø80-90mm	Ø80-90mm
+ 0.48m-ref	+ 0.55m-ref

# 4 Practice

# Practice

- Measurement of PFAS and Darcy FLUX: 6 wells and 8 measurement points

## Exposure period: 31 days

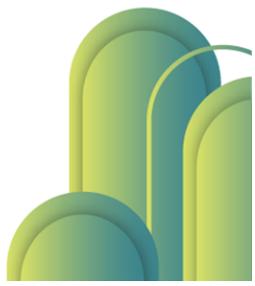
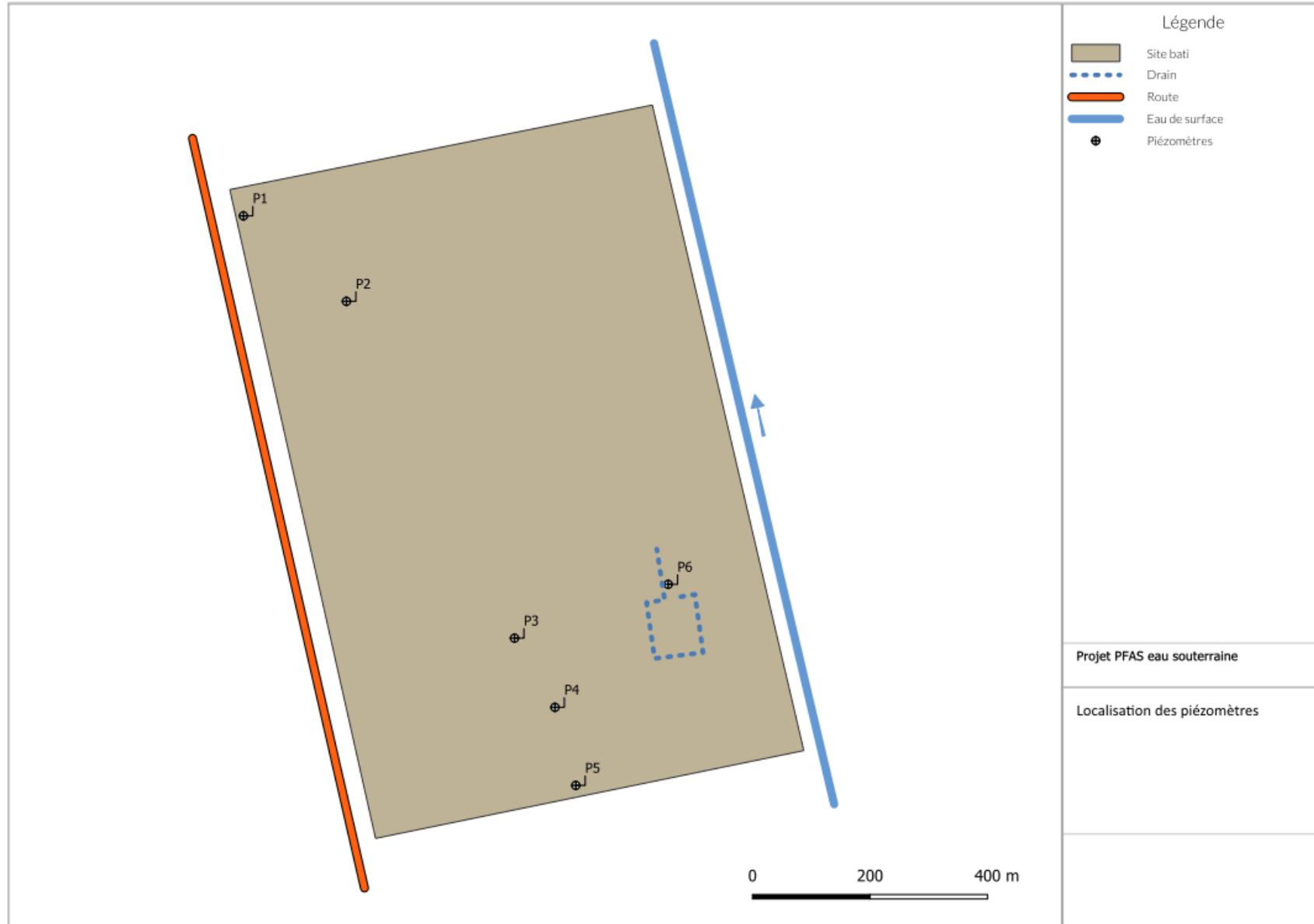
- ✓ Duration >>> traditional sampling (a few minutes)
- ✓ Results averaged over time: realistic exposure scenario
- ✓ Higher probability of detecting contaminants of interest
- ✓ Better understanding of the dynamics

## Objectives:

- ✓ Measure PFAS flux
- ✓ Identify PFAS source
- ✓ Measurements at different depths per well
- ✓ Preferential flow paths: dispersion potential
- ✓ Assess possible treatment techniques
- ✓ Over time: monitoring treatment effectiveness

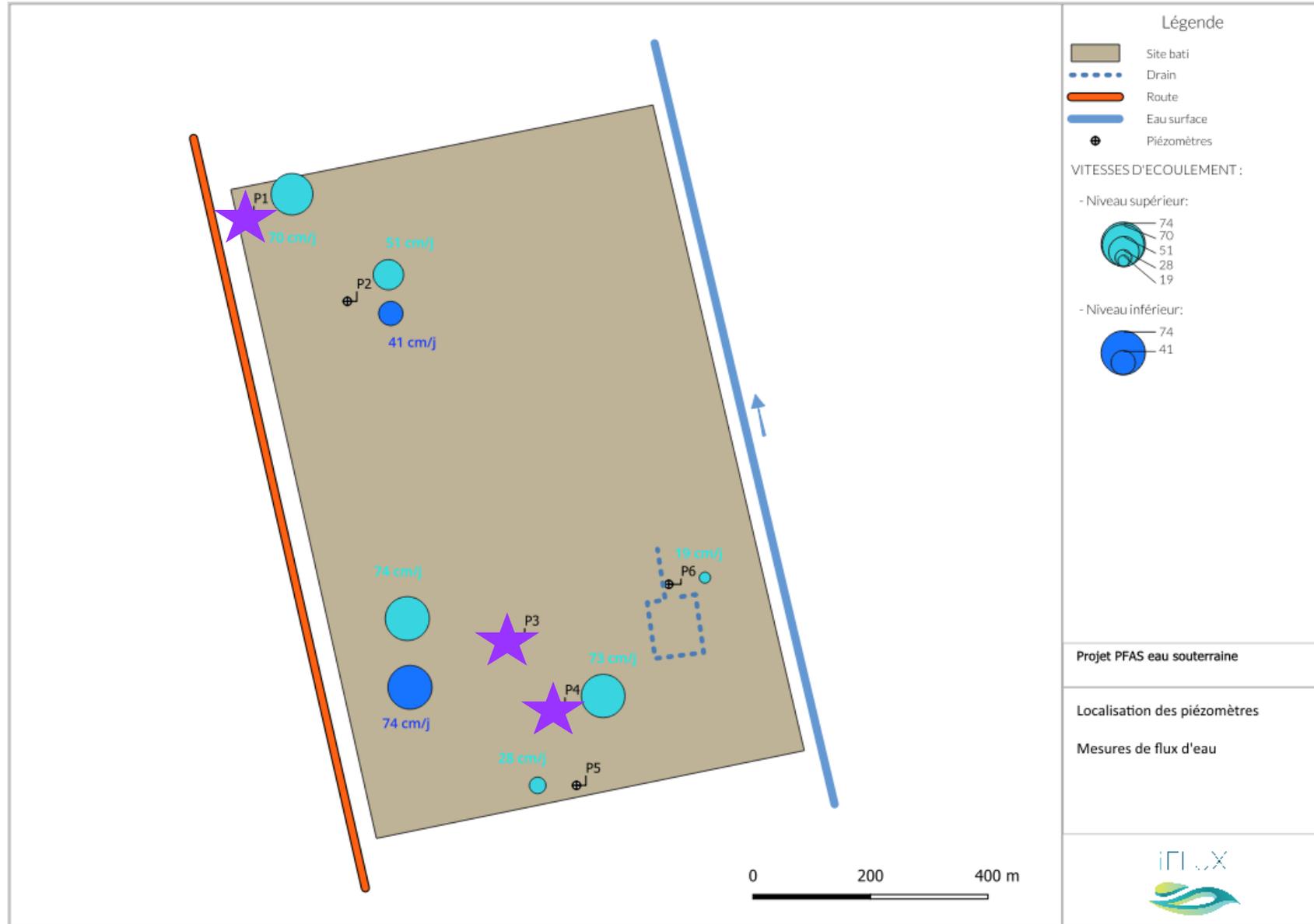
# Practice

## Wells



# Practice : Groundwater Flux

Preferential pathways



**Légende**

- Site bâti
- Drain
- Route
- Eau surface
- Piezomètres

**VITESSES D'ECOULEMENT :**

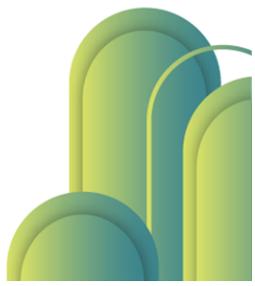
- Niveau supérieur:
  - 74
  - 70
  - 51
  - 28
  - 19
- Niveau inférieur:
  - 74
  - 41

Projet PFAS eau souterraine

Localisation des piézomètres

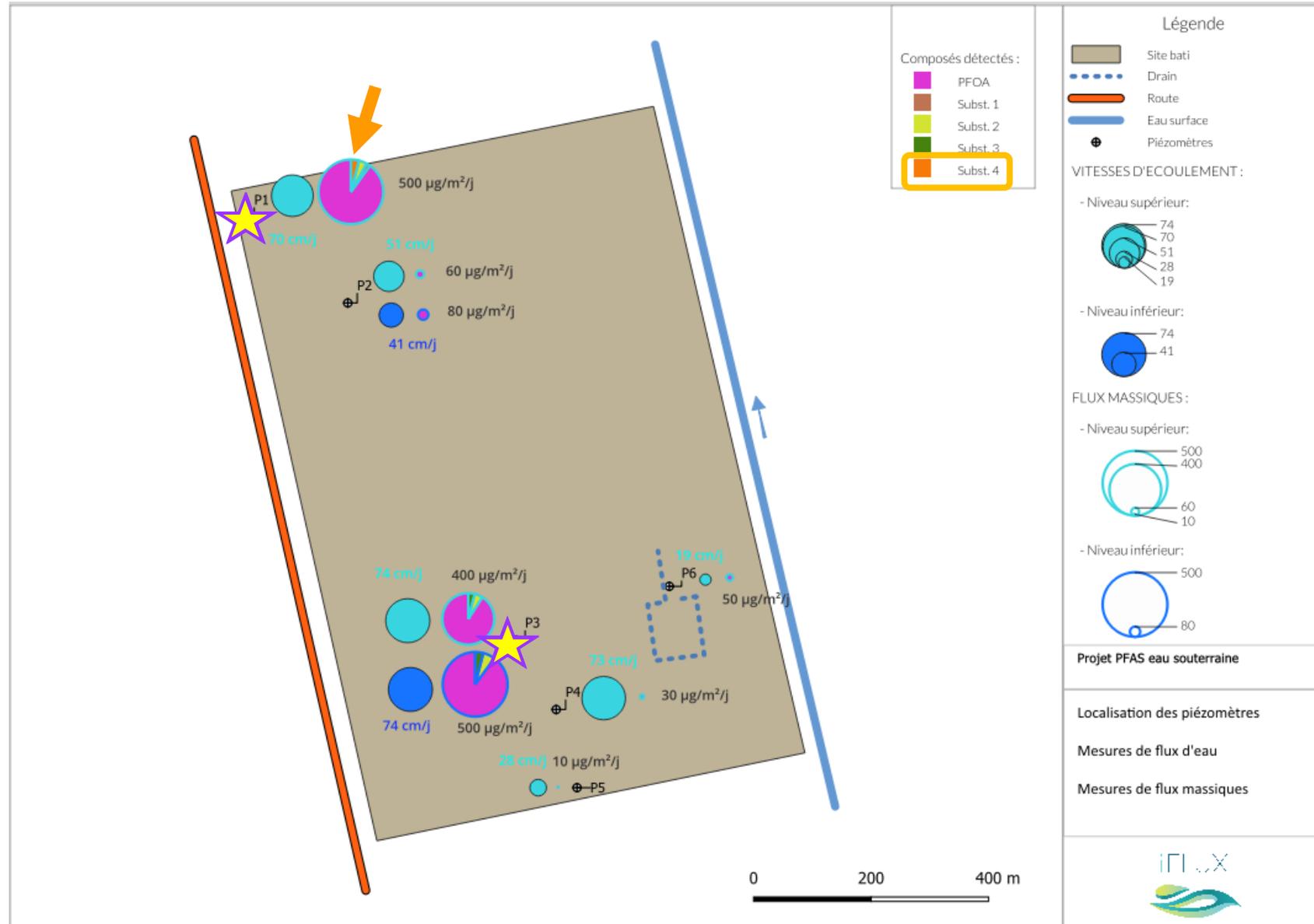
Mesures de flux d'eau

Water flux:  
cm<sup>3</sup>/cm<sup>2</sup>/day



# Practice : Groundwater Flux and PFAS Flux

Dispersion risk

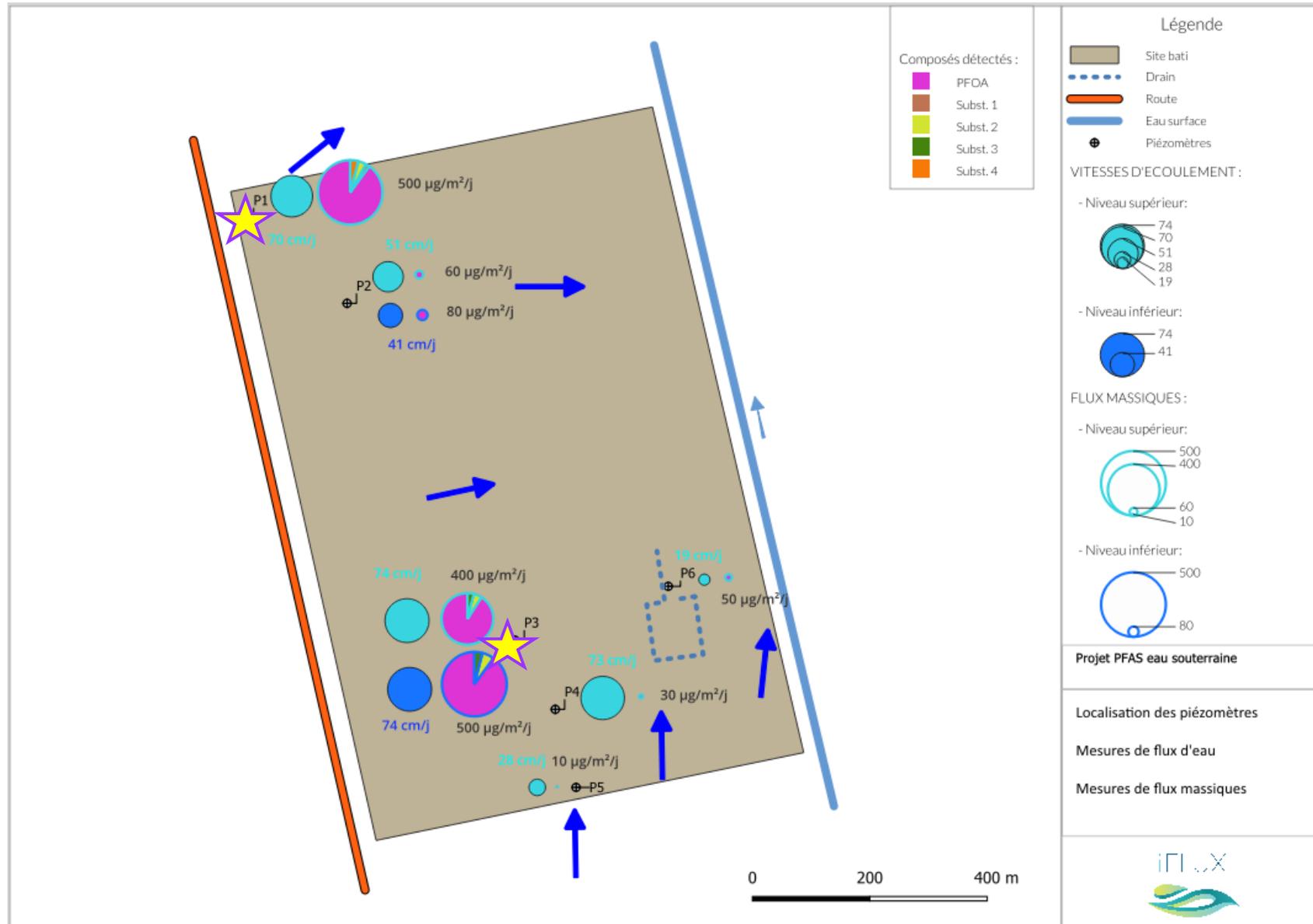


Water flux:  
cm<sup>3</sup>/cm<sup>2</sup>/day

PFAS flux:  
µg/m<sup>2</sup>/day

# Practice : Groundwater Flux and PFAS Flux

Flow direction

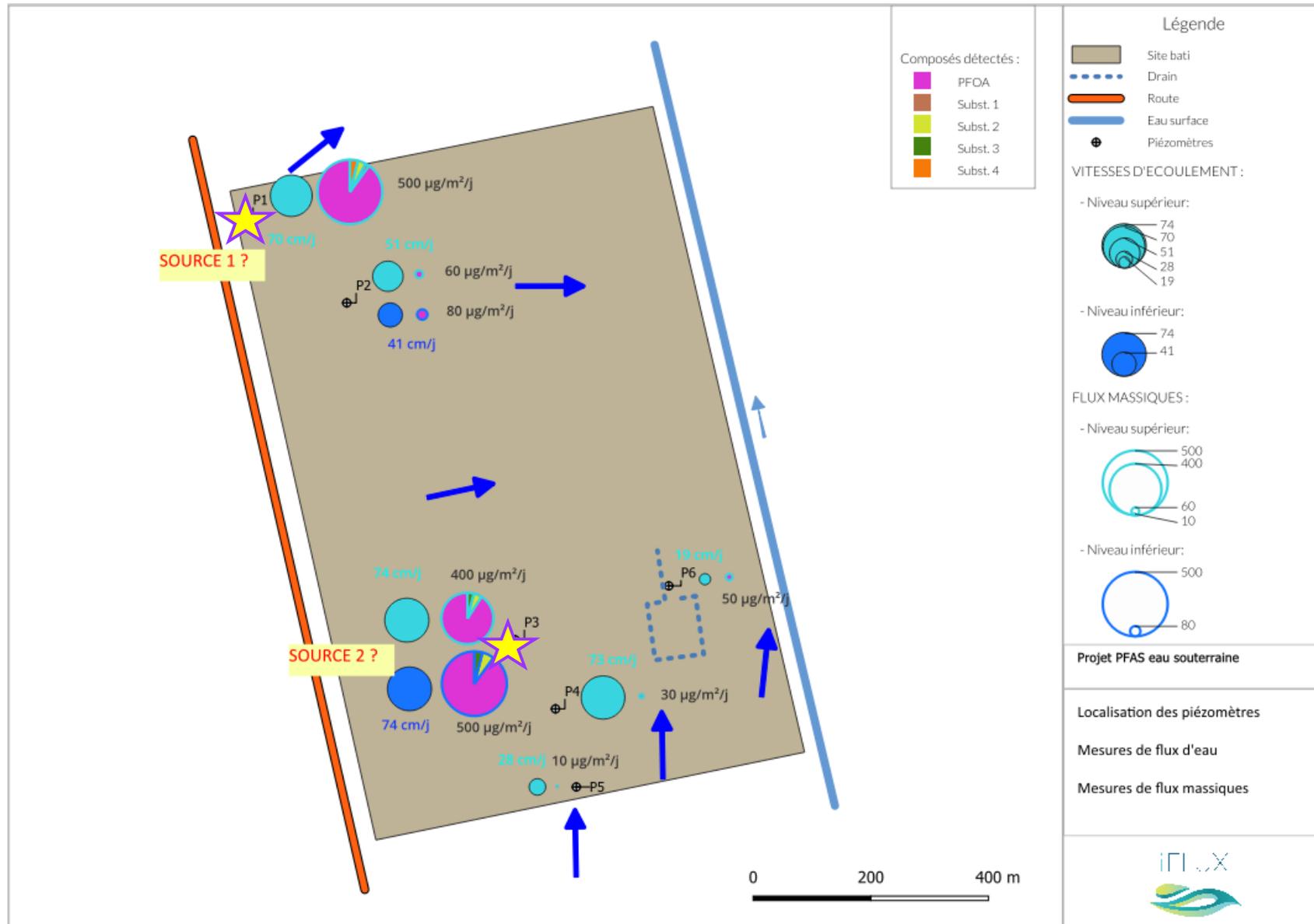


Water flux:  
cm<sup>3</sup>/cm<sup>2</sup>/day

PFAS flux:  
µg/m<sup>2</sup>/day

# Practice : Groundwater Flux and PFAS Flux

Sources ?



Water flux:  
cm<sup>3</sup>/cm<sup>2</sup>/day

PFAS flux:  
µg/m<sup>2</sup>/day



# Thank you! Thoughts?



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