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Faculty of Sciences Ben M'sik
Department of Geology**

**Conceptual model of fractured hard rock aquifer
functioning through monitoring contamination
downstream a landfill (Case of Médiouna landfill,
Casablanca, Morocco).**

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graph LR; A[Objectifs] --> B[Physical setting]; B --> C[Methodology]; C --> D[Hydrochemical results]; D --> E[Conclusion];
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Objectifs

Physical
setting

Methodology

Hydrochemical
results

Conclusion

INTRDUCTION

A groundwater pollution has been detected down stream the Mediouna landfill a few years after its start up (1991).

The aim of this study carried out, is to assesse the groundwater quality and establish a monitoring net work. Its requires an understanding of the particular aquifer system, its recharge and pollution pathways.

Using theses information a conceptual hydrogeological model can be formulated and only then a groundwater monitoring net work can be designed (Tredoux, 2004).



LANDFILLING



LEACHATE

RAINFULL INFILTRATION

MOISTURE

O.M DECOMPOSITION

The leachate composition are diverse, with high pollution index and depends on

Age of the landfill

Solide waste nature

Management

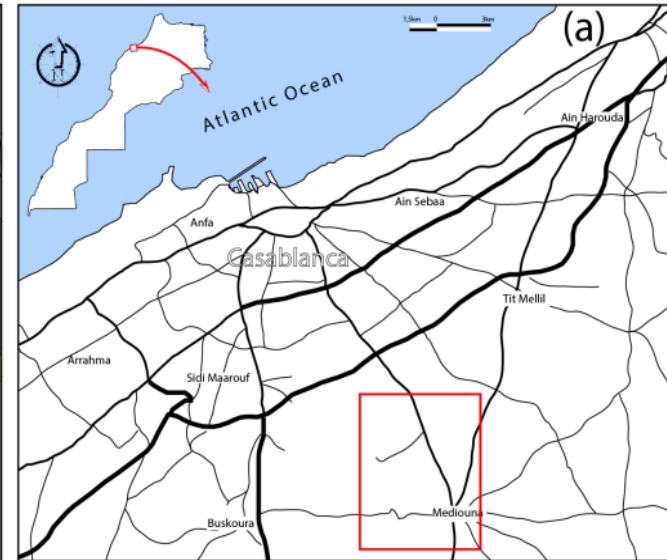
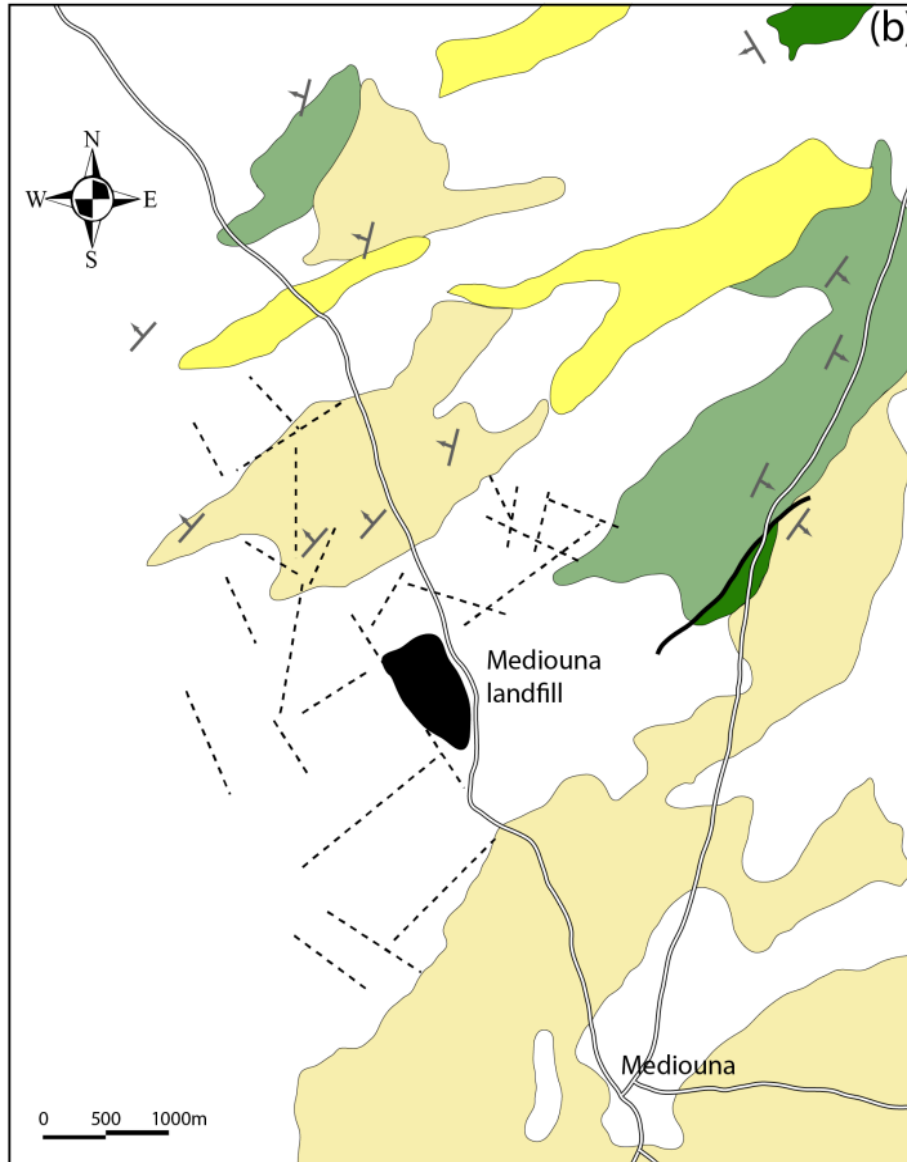
Objectifs

Physical setting










Methodology

Hydrochemical results

Conclusion



Legend

-  Calcareous dune (Plio-Quaternary)
-  Red silt (Quaternary)
-  Hydromorphic ground (Quaternary)
-  Schist (Ordovician)
-  Quartzite (Cambrian)
-  Lineament
-  Fault
-  Dip
-  Road



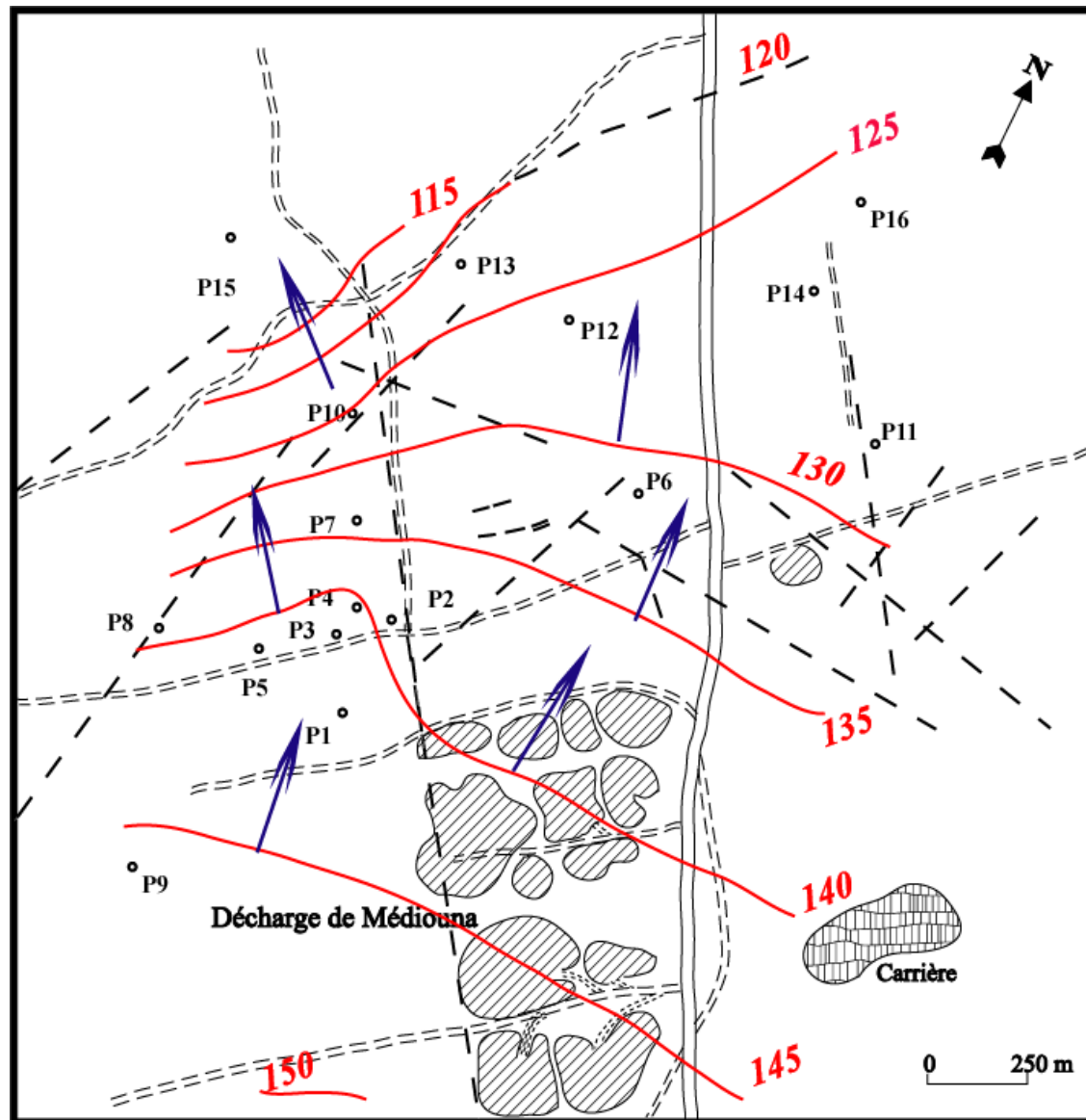
Objectifs

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Piezometric map of Mediouna Landfill

Piezometric line

Fracture

Track

Objectifs

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SW

NE

military camp

landfill

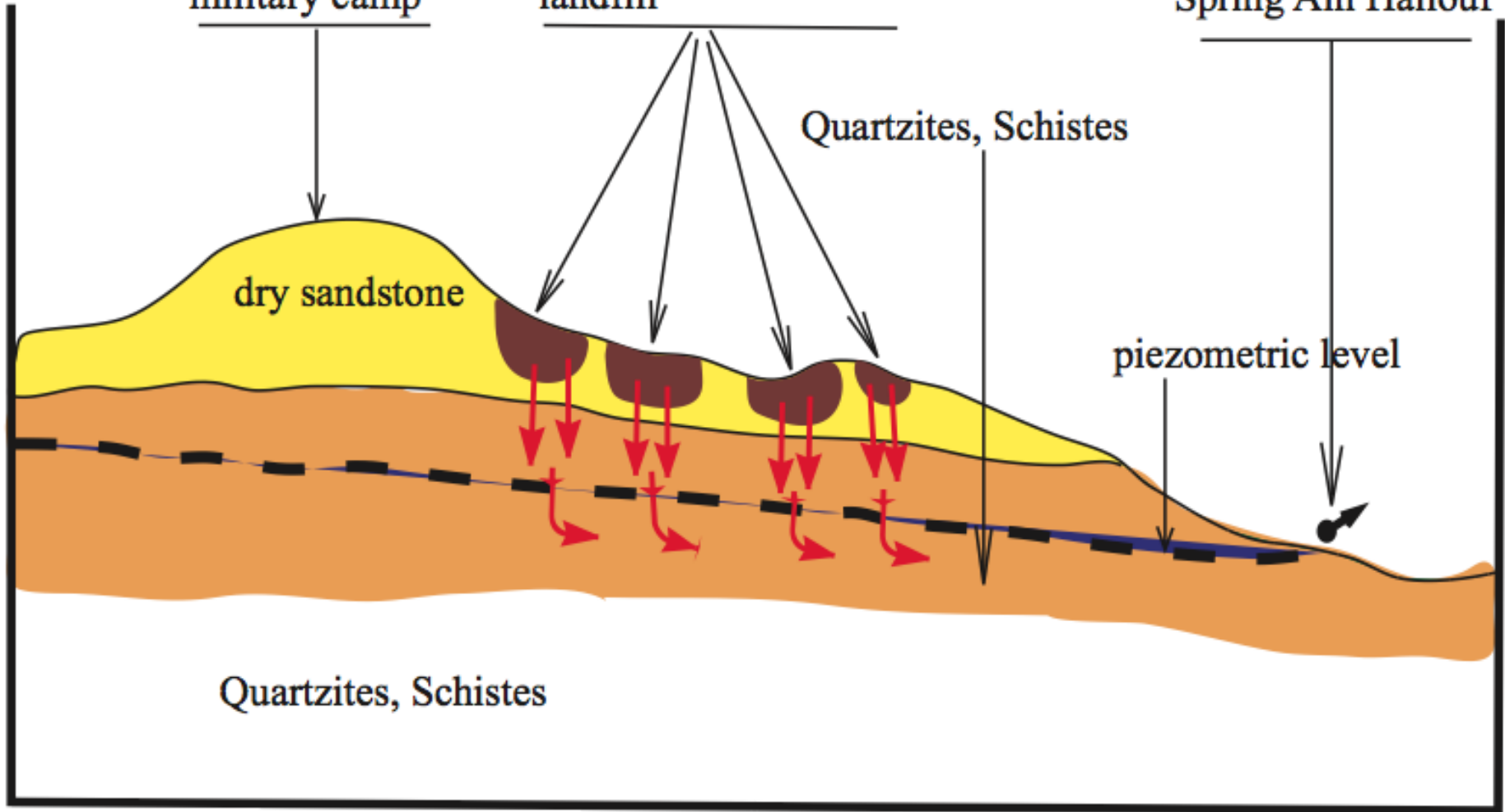
Spring Aïn Hallouf

dry sandstone

Quartzites, Schistes

piezometric level

Quartzites, Schistes



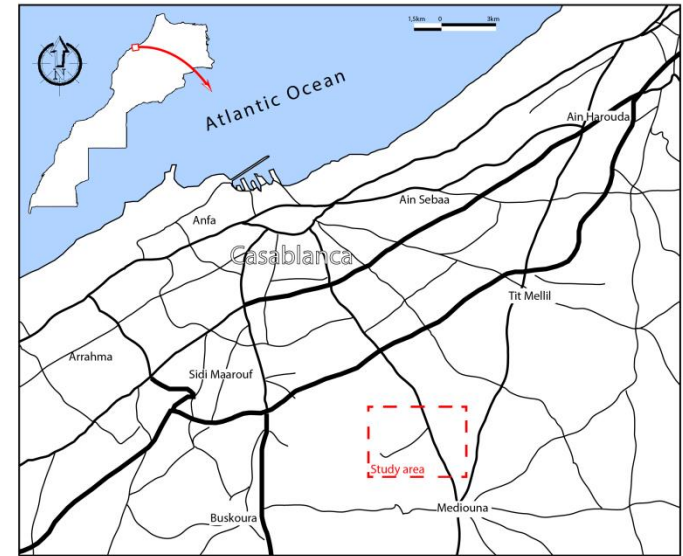
Objectifs

Physical setting

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Conclusion



Legend

- Douar
- Lineaments
- Wells
- Regional road
- Main road
- Tracks
- ◆ Spring Ain Hallouf
- Quarries
- Landfill Mediouna
- Forest

0 250 500 750 m



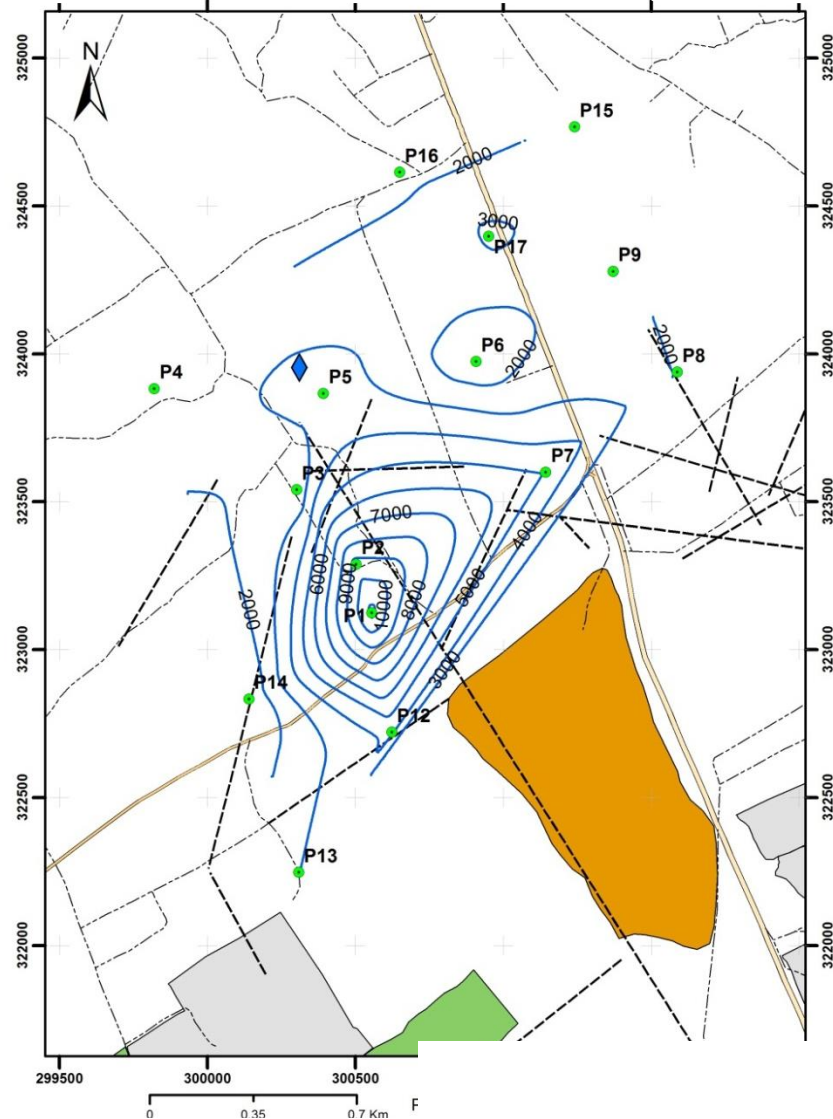
Objectifs

Physical setting

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Legend

- | | | |
|--------------------|----------------|-------------------|
| EC | Lineaments | Quarries |
| CE | Track | Mediouna landfill |
| Spring Ain Hallouf | Principal road | Forest |
| | Regional road | |

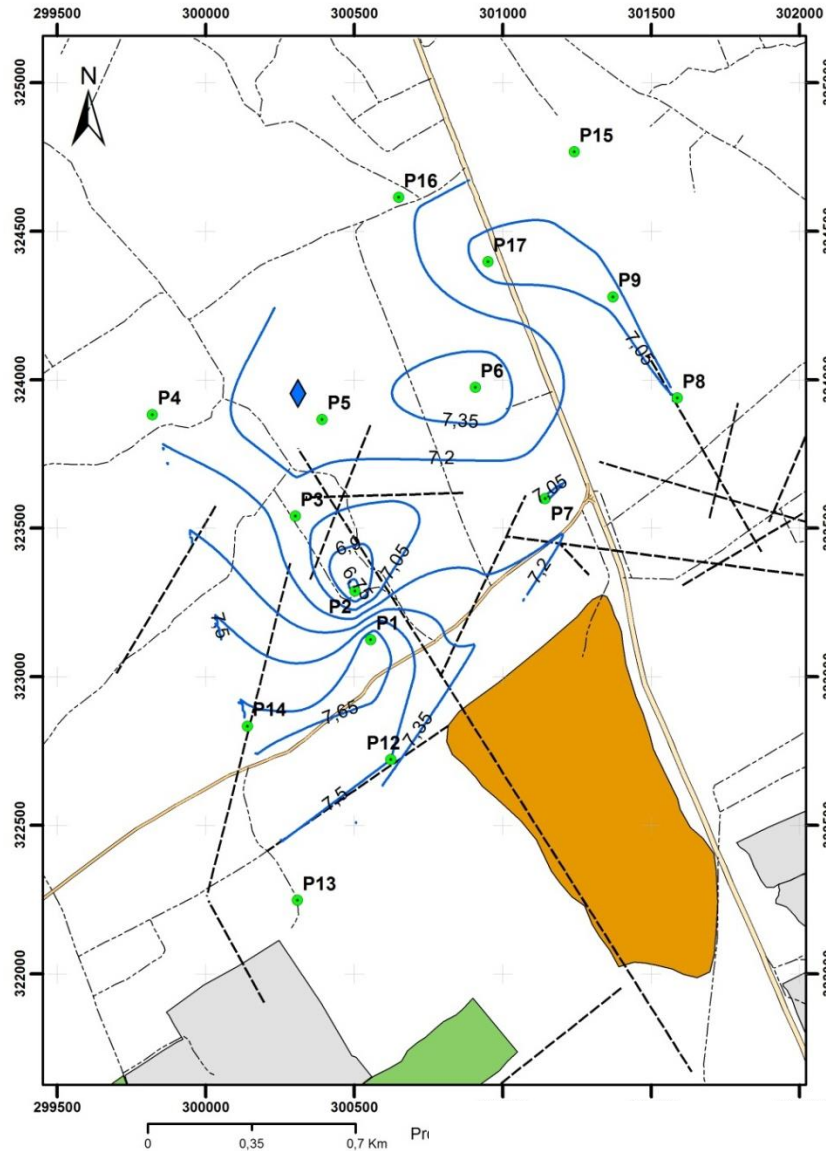
Objectifs

Physical setting

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Legend

- pH
- Spring Ain Hallouf
- Lineaments
- Track
- Principal road
- Regional road
- Quarries
- Mediouna landfill
- Forest

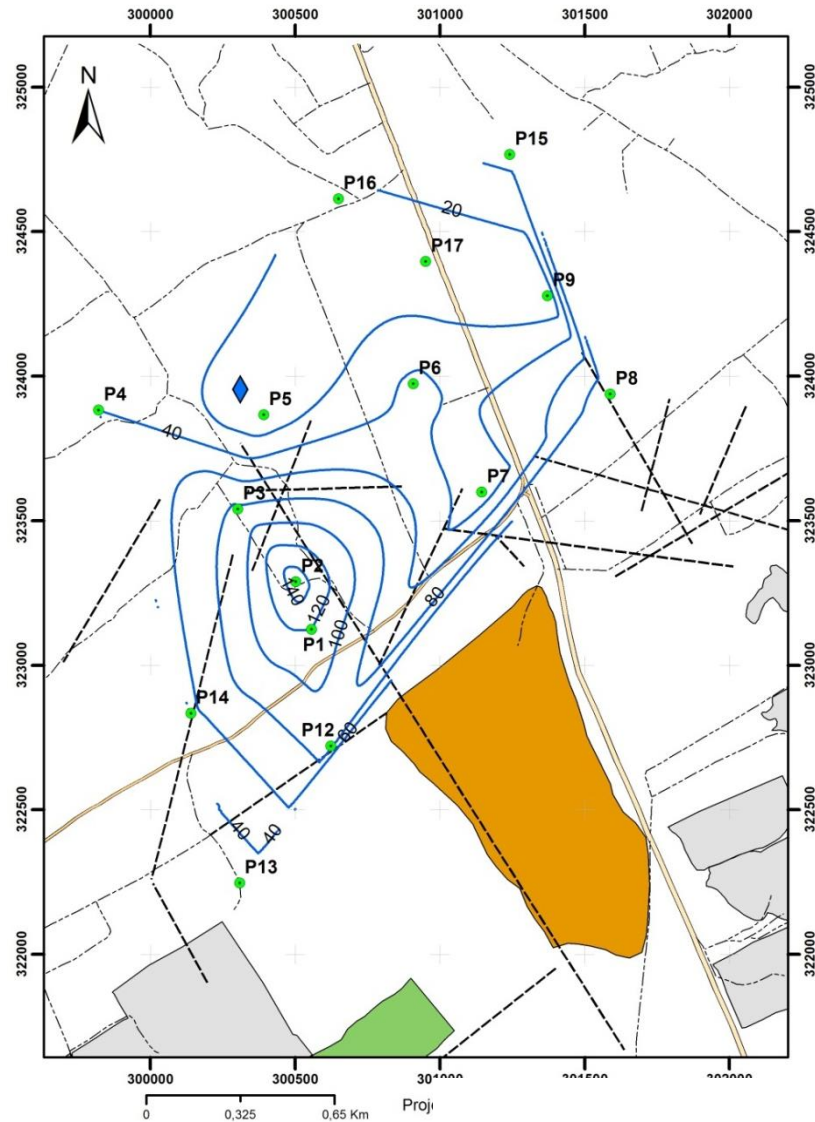
Objectifs

Physical setting

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Conclusion



Legend

- Well
- COD
- ◆ Spring Ain Hallouf
- Lineaments
- - - Track
- Principal road
- Regional road
- Quarries
- Mediouna landfill
- Forest

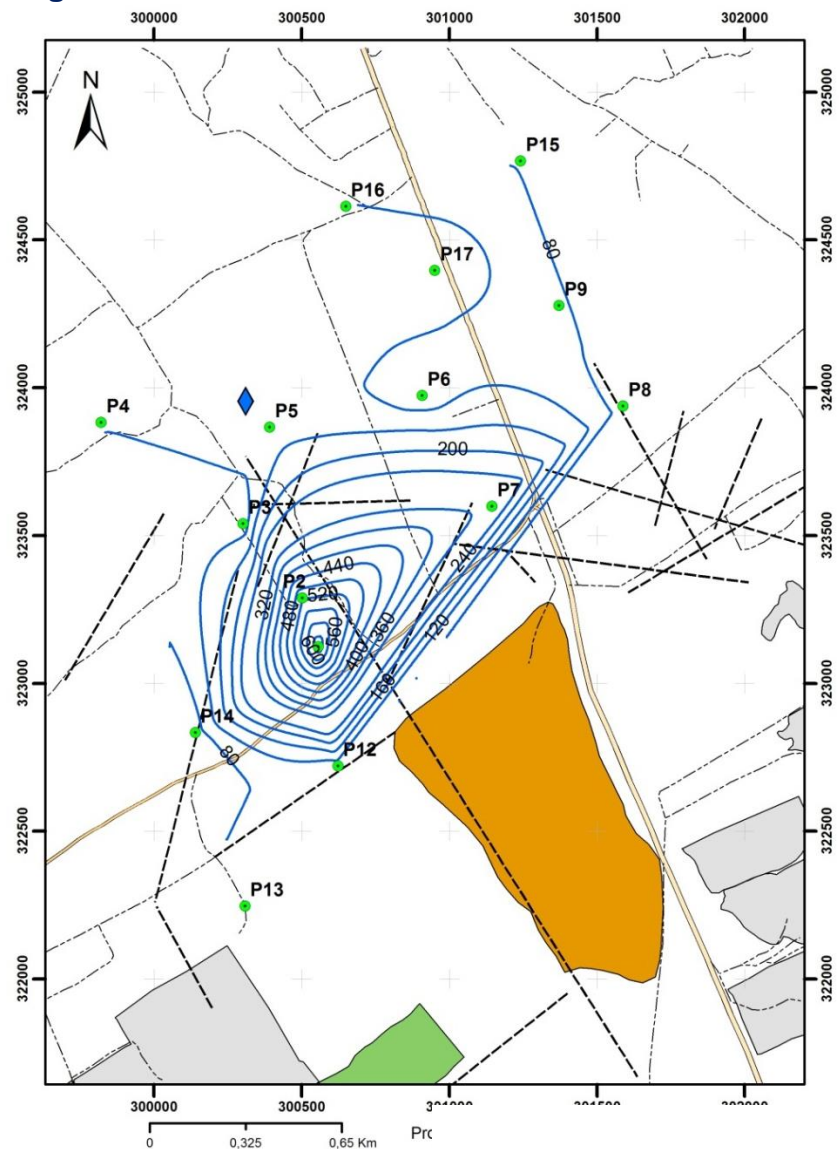
Objectifs

Physical setting

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Conclusion



Legend

- | | | |
|--------------------|----------------|-------------------|
| Wells | Lineaments | Quarries |
| HCO3- | Track | Mediouna landfill |
| Spring Ain Hallouf | Principal road | Forest |
| | Regional road | |

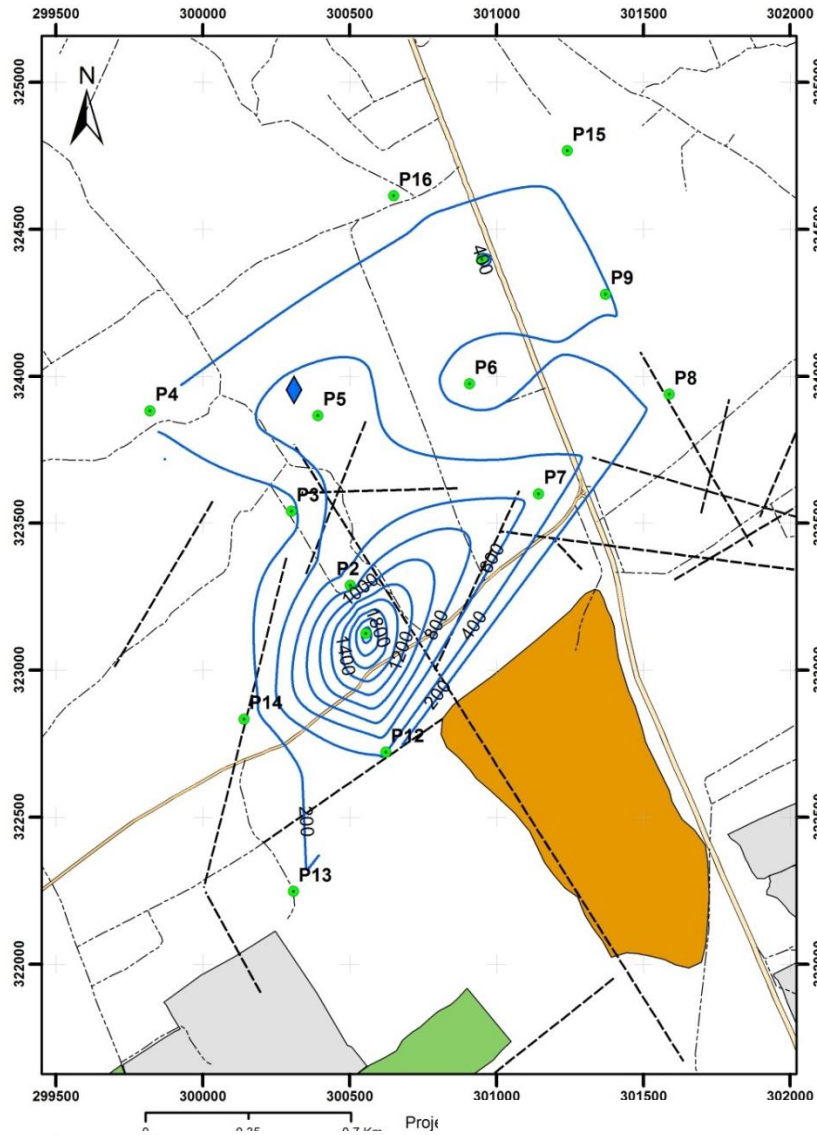
Objectifs

Physical setting

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Legend

- | | | |
|--------------------|----------------|-------------------|
| Wells | Lineaments | Quarries |
| CI- | Track | Mediouna landfill |
| Spring Ain Hallouf | Principal road | Forest |
| | Regional road | |

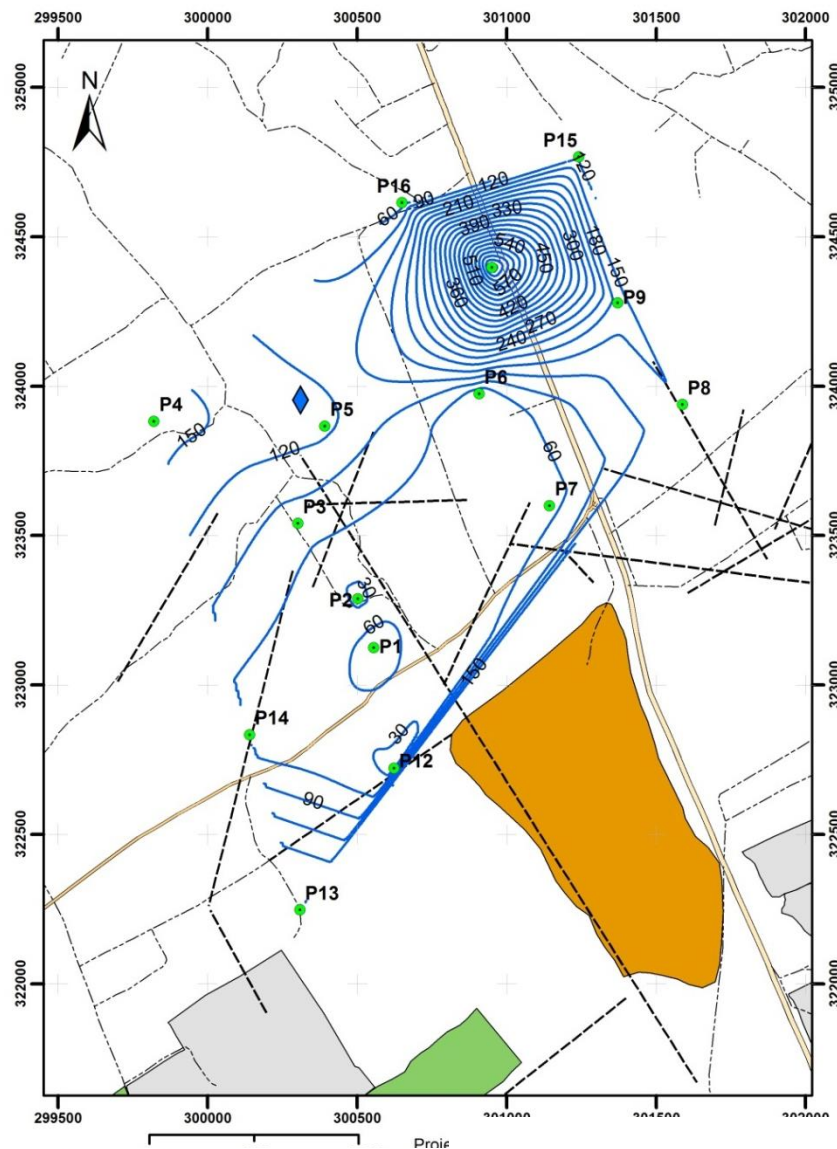
Objectifs

Physical setting

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Hydrochemical results

Conclusion



Legend

- | | | |
|--------------------|----------------|-------------------|
| Wells | Lineaments | Quarries |
| SO4- | Track | Mediouna landfill |
| Spring Ain Hallouf | Principal road | Forest |
| | Regional road | |

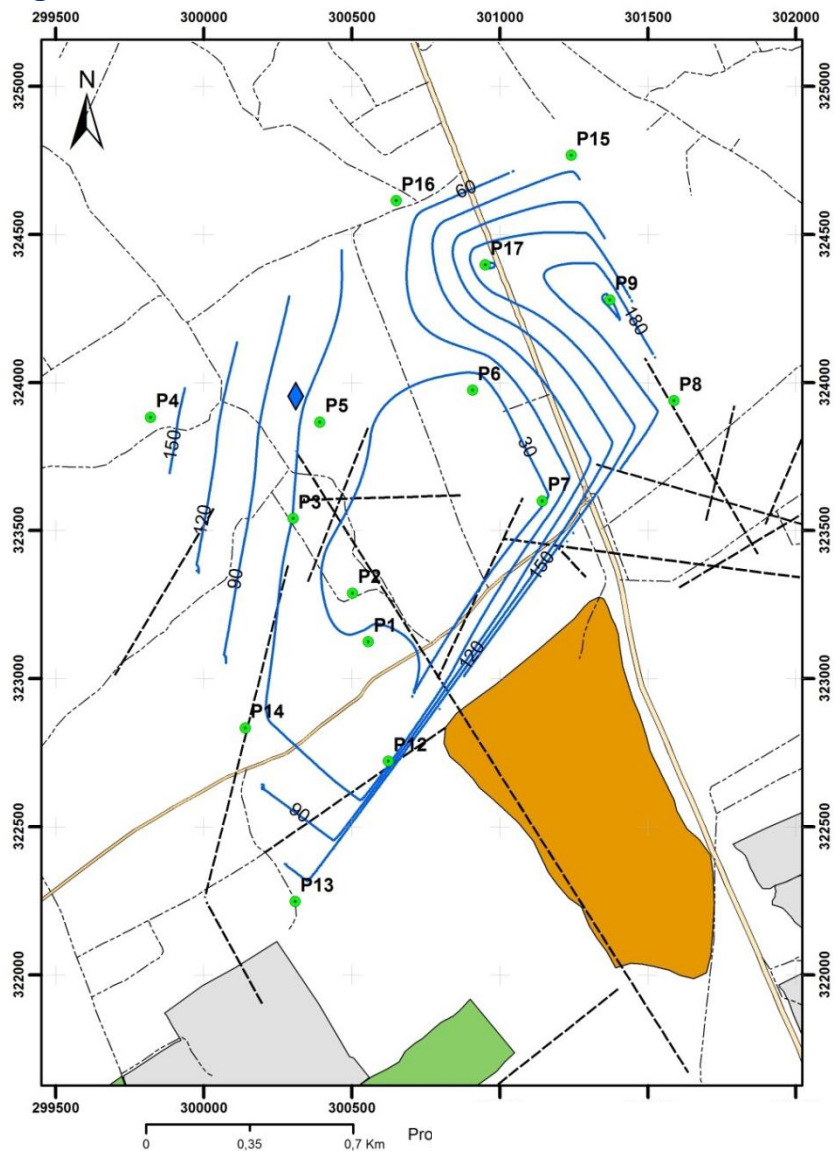
Objectifs

Physical setting

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Legend

- NO3-
- ◆ Spring Ain Hallouf
- Lineaments
- - - Track
- Quarries
- Mediouna landfill
- Forest
- Principal road
- Regional road

Objectifs

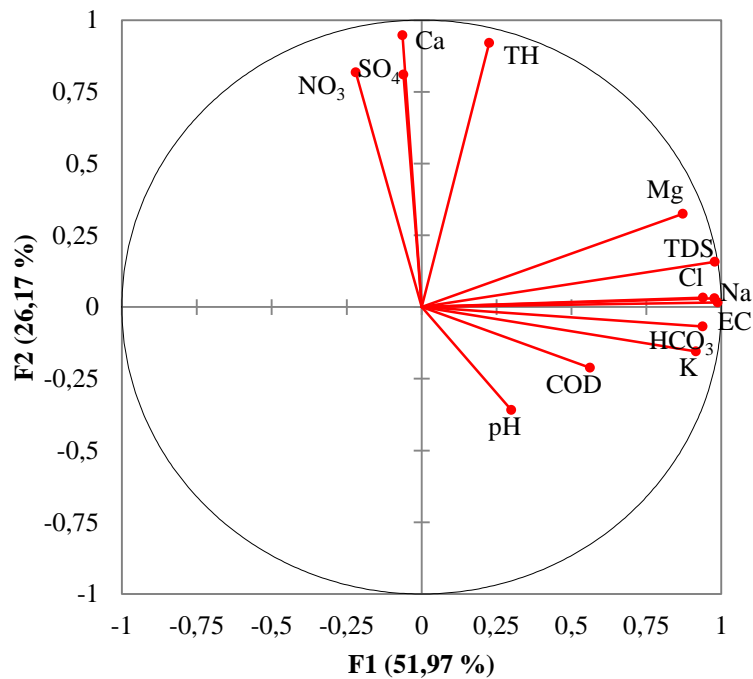
Physical
setting

Methodology

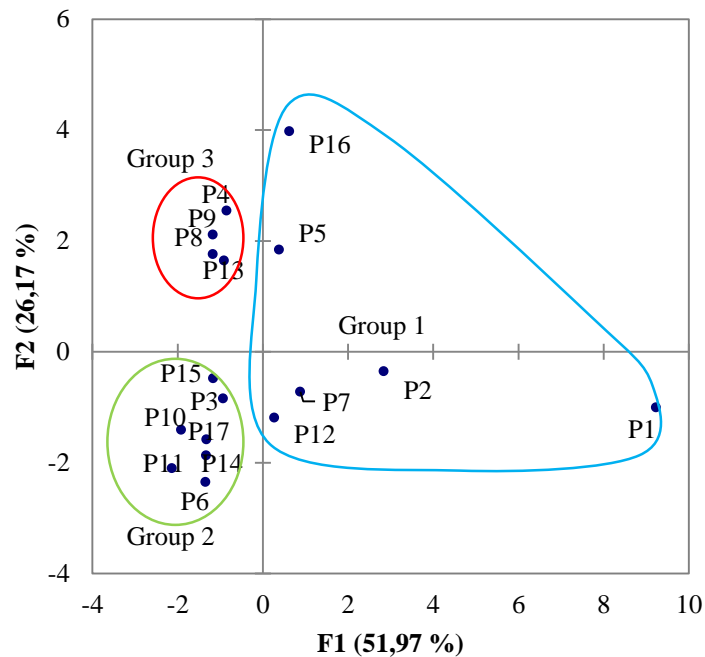
Hydrochemical
results

Conclusion

Variables (axis F1 et F2 : 78,14 %)



Observations (axis F1 et F2 : 78,14 %)



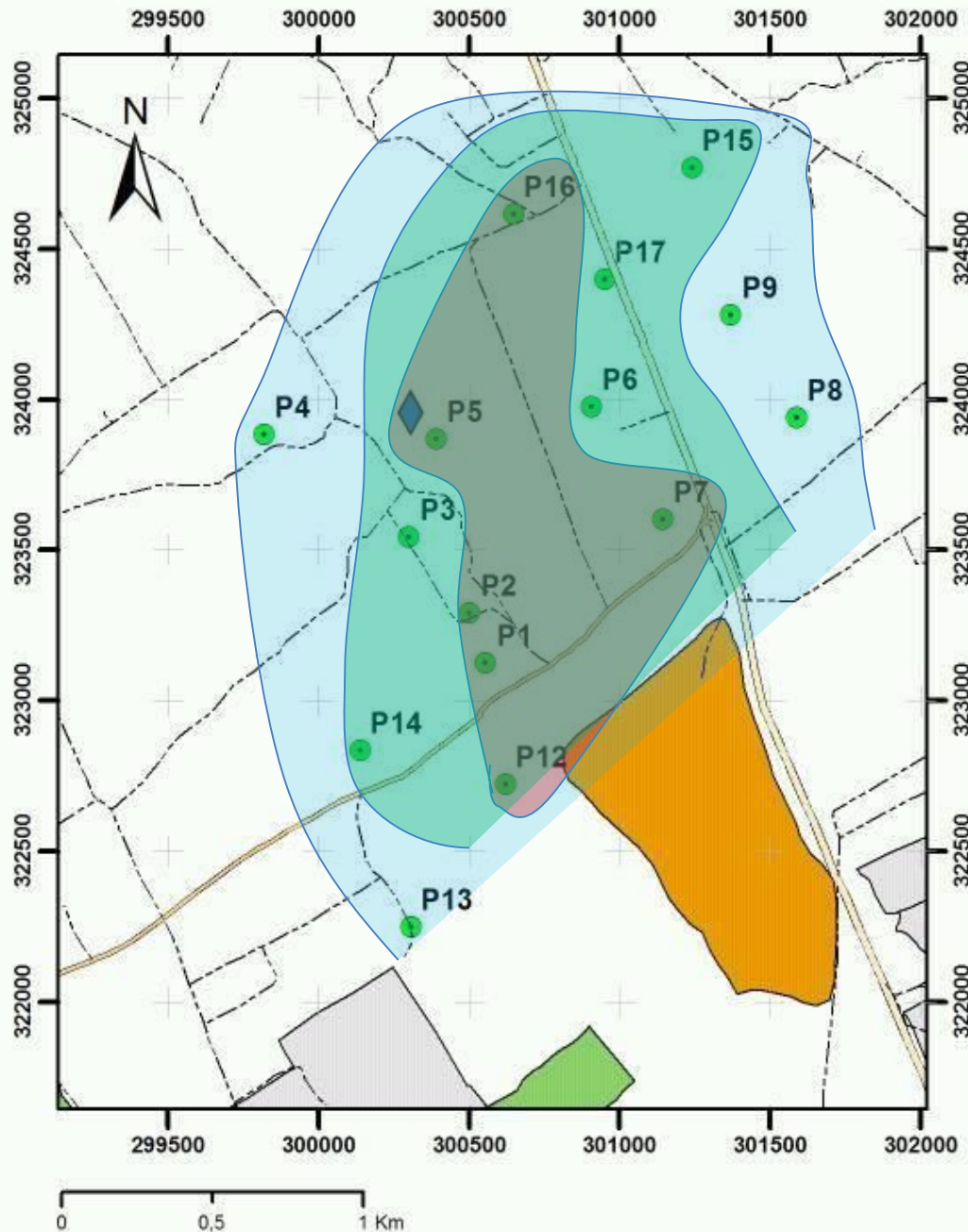
Objectifs

Physical
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Legend

- Douar
- ◆ Spring Ain Hallouf
- - - Track
- Principal road
- == Regional road
- ▨ Quarries
- Mediouna Landfill
- Forest
- Wells

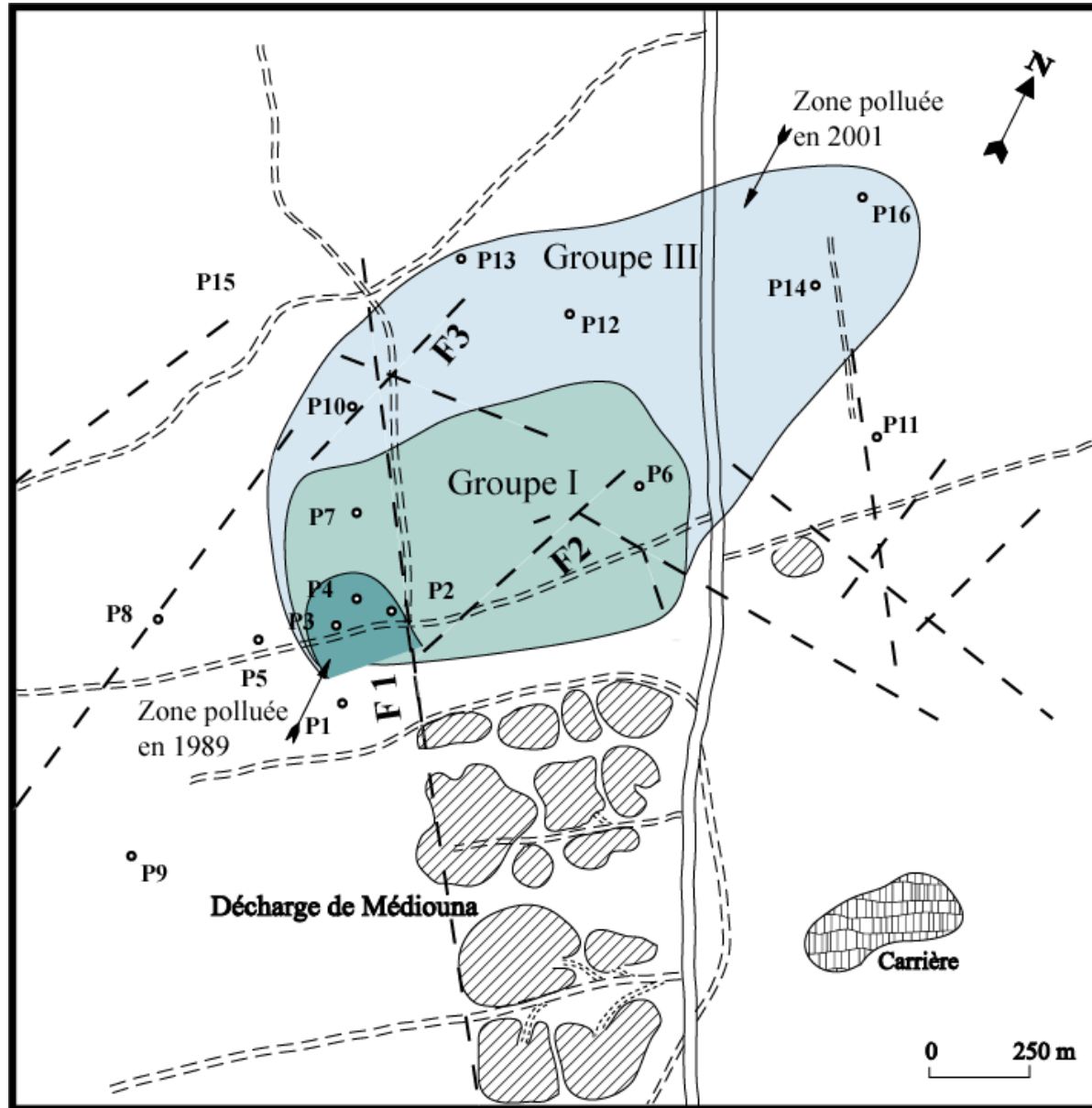
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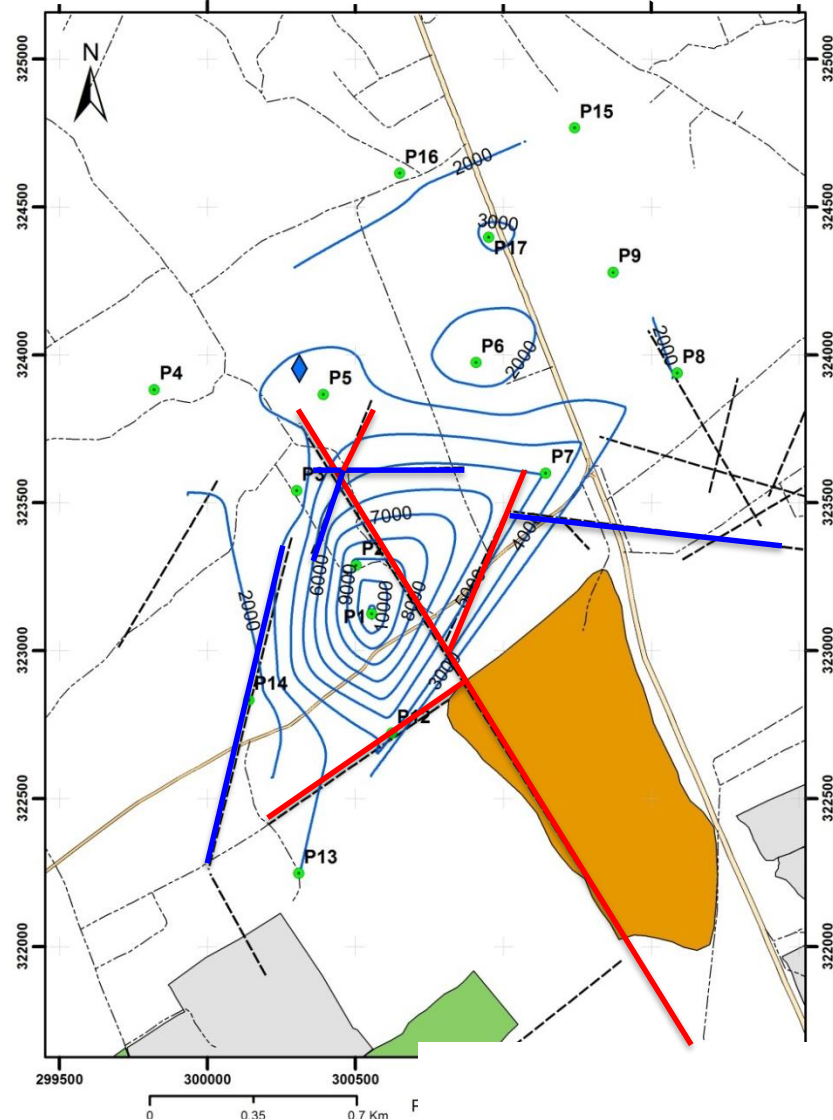
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Legend

- | | | |
|--------------------|----------------|-------------------|
| EC | Lineaments | Quarries |
| CE | Track | Mediouna landfill |
| Spring Ain Hallouf | Principal road | Forest |
| | Regional road | |

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The statistical treatment of hydrochemical results distinguish three groups:

- A first group with strong mineralization and high concentrations of organic matter.
- A second intermediate group with average concentrations of mineral and organic matter.
- A third group characterized by low mineralization and total lack of organic matter

The groundwater pollution caused by landfill leachate progresses downstream carried by lineaments which serve as drain, demonstrating therefore the structural control on the flows and the spread of pollution. The higher contents are recorded close to the landfill which it decreases with distance of the landfill.

A conceptual model is proposed and requires validation.