



**Interreg**  
CENTRAL EUROPE

**AMIIGA**

European Union  
European Regional  
Development Fund



TAKING  
COOPERATION  
FORWARD

- Tavolo tecnico  
Parma, 2.11.2016
- AMIIGA - Integrated Approach to Management  
of Groundwater quality

- Comune di Parma - Sito: Piazzale Santa Croce



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Il progetto  
AMIIGA

Interreg  
Central Europe

Azione Pilota a  
Parma



# PROGETTO AMIIGA



*Integrated Approach to Management of Groundwater quality*

Da settembre 2016 ad agosto 2019

36 mesi, 12 partner, 6 paesi, 7 azioni pilota, 7 piani/strategie

Co-finanziato dal programma INTERREG CENTRAL EUROPE





## Programma di cooperazione transnazionale nel quadro dell'obiettivo Cooperazione Territoriale Europea

Cooperare nell'Europa Centrale per rendere le nostre città luoghi migliori dove vivere e lavorare

### *Taking cooperation forward*

Catalizzatore di soluzioni intelligenti che rispondano alle sfide territoriali nel campo dell'innovazione, della low-carbon economy, dell'ambiente, della cultura e dei trasporti



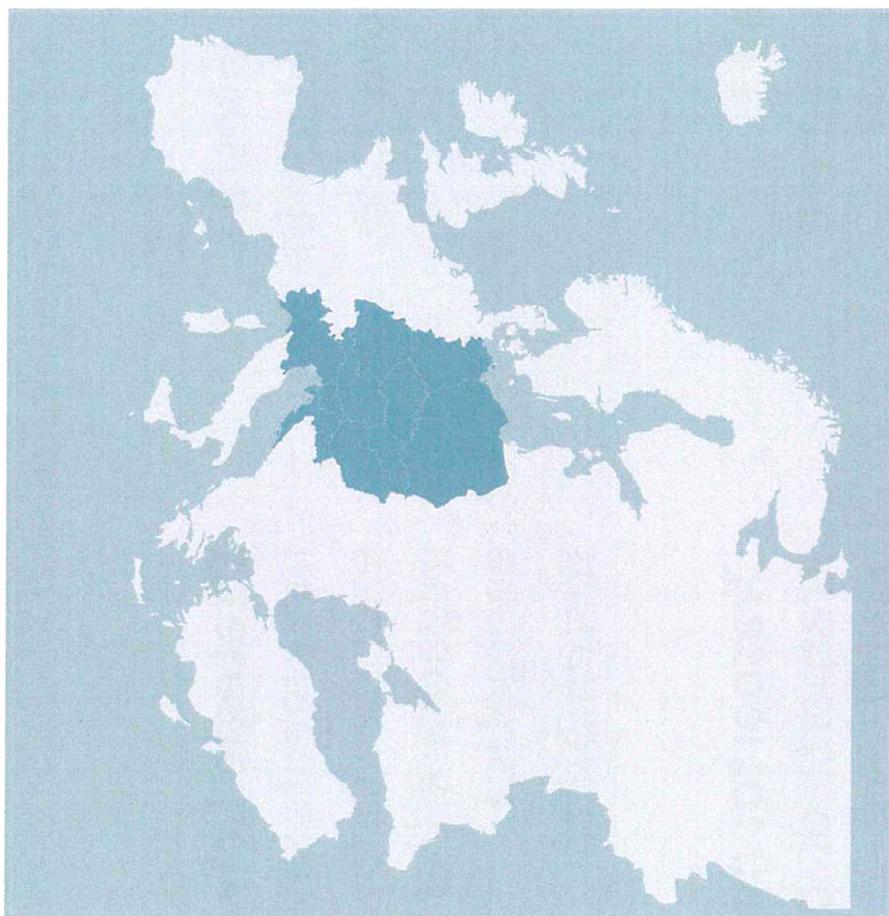
# INTERREG CENTRAL EUROPE



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Paesi partecipanti: Austria, Croazia, Repubblica Ceca, Slovenia  
Germania (parte), Ungheria, Italia (parte), Polonia, Slovacchia



## Priorità

**Innovazione:** investire in modo più efficace in ricerca, innovazione, educazione

*competitività*

**Strategie Low Carbon:** incrementare l'uso delle energie rinnovabili e migliorare l'efficienza energetica

*sostenibilità*

**Risorse naturali e culturali:** proteggere e utilizzare in modo sostenibile il patrimonio culturale e naturale

*crescita sostenibile*

Trasporto: migliorare i trasporti di persone e merci

*connessione*

### 3.3 Migliorare la gestione ambientale delle aree funzionali urbane per migliorarne la vivibilità

- AMIIGA affronta il *problema* della contaminazione delle acque sotterranee sia nei centri urbani che nelle periferie, il cui insieme costituisce la FUA (aree urbane funzionali)
- La contaminazione delle acque sotterranee è un problema che va al di là dei confini amministrativi degli Enti pubblici locali
- Poiché le fonti di contaminazione che si trovano nel centro città influiscono sulla qualità delle acque sotterranee delle periferie a valle e viceversa, si rende necessario un intervento efficace su scala unitaria (FUA)
- In Europa c'è poca esperienza nella gestione di tali sfide in (FUA) e spesso le pratiche correnti di gestione e misurazione della mitigazione delle fonti di inquinamento ambientale non sono sufficienti

## AMIICA: FUA



La FUA è un'area allargata (nel nostro caso intesa anche come la rispettiva proiezione del volume dell'acquifero) che comprende la zona urbana, quella periurbana e le zone extraurbane, tutte fra di loro connesse dal punto di vista ambientale, idrogeologico, economico, demografico, dei trasporti



# AMIIGA: OBIETTIVI



Rafforzare le capacità del settore pubblico per la pianificazione e la gestione delle acque sotterranee nelle FUAs

Sviluppare strumenti e procedure per la caratterizzazione dei fenomeni di inquinamento delle acque sotterranee

Fornire ai decisorî pubblici tecnologie innovative di bioremediation per migliorare la qualità delle acque sotterranee

Sviluppare il 'piano di gestione delle acque' come strumento strategico



# AMIIGA: APPROCCIO



Il progetto AMIIGA si concentra su strategie di valutazione dei fenomeni di inquinamento, di bonifica e di gestione integrata e sarà attuato attraverso 7 azioni pilota in 7 differenti aree. I risultati saranno valutati congiuntamente dal partenariato del progetto.

La partnership di AMIIGA utilizzerà una combinazione di tecnica, ricerca, gestione ed esperienza, e lo scambio di conoscenza necessario per affrontare le complesse sfide della contaminazione delle acque sotterranee.



# AMIICA: GRUPPO DI LAVORO



Comune di Parma  
Settore Ambiente e Mobilità  
Servizio Presidio attività estrattive e qualità acque

Marco Ghirardi - responsabile progetto

Giovanni De Leo - esperto

Patrizia Marani - Uff. Progetto Europa

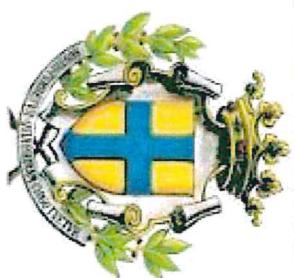
Gianluca Signaroldi e Giancarlo Zanacca

- Comunicazione

*Partner associato*

Regione Emilia Romagna

Settore: Servizio giuridico  
dell'ambiente, rifiuti,  
bonifica siti contaminati  
e servizi pubblici  
ambientali



Incarichi esterni da  
affidare

Regional Implementation  
Group

# AMIICA: 1 PARTNER



European Union  
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Central Mining Institute (Poland) - Project Lead Partner

City of Jaworzno (Poland)

State Capital of Stuttgart (Germany)

City of Novy Bydzov (Czech Republic)

Technical University of Liberec (Czech Republic)

Lombardy Region (Italy)

Polytechnic University of Milan (Italy)

City of Parma (Italy)

Geological Survey of Slovenia (Slovenia)

Ljubljana Waterworks and Sewerage (Slovenia)

University of Zagreb, Faculty of Civil Engineering (Croatia)

Water supply company Zadar (Croatia)



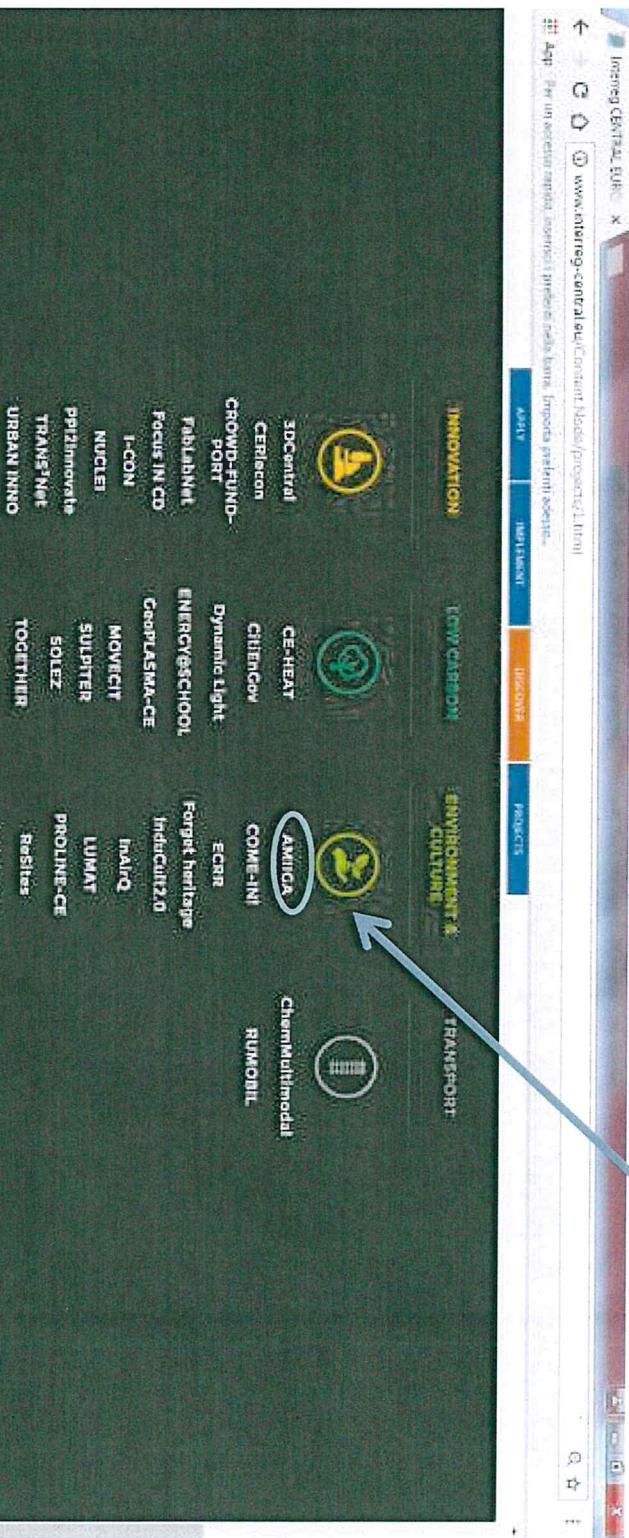
# IL SITO: PER SAPERNE DI PIU'

[www.interreg-central.eu](http://www.interreg-central.eu)

## Environment & Culture



AMIIGA



# AMIICA: AZIONI PILOTA



- Valutazione dell'attenuazione naturale come opzione di bonifica per la FUA di Parma

- Stima dell'efficacia di diversi approcci di intervento in acquiferi idropotabili variamente inquinati in una tipica FUA slovena (Lubiana, SI)

- Valutazione dei rapporti fra gli inquinamenti puntuali e la loro diffusione negli acquiferi (Milano, IT)

- Potenziamento delle metodologia di bioremediation in situ (Novy Bydzov FUA, CZ)

- Trattamento passivo tramite barriere bioreattive (Jaworzno, PL)

- Efficientamento delle metodologie integrate di monitoraggio e bonifica (Stoccarda, DE)

- Applicazione delle conoscenze e dei risultati acquisiti con il progetto FOKS - modalità inversa (Bokanjac FUA, HR)



# AZIONE PILOTA: PARMA

Output O.T2.4 Assessment of Natural Attenuation potential as a remediation option in Parma FUA (IT)	Demonstrative pilot action on evaluating the natural attenuation processes and its applicability at the FUA scale as a perspective option for remediation of groundwater polluted by chlorinated hydrocarbons in the Parma FUA. The pilot action will consist of periodical monitoring campaigns of groundwater samples collected from existing & new monitoring wells for analysis of specific compounds, including application of innovative tools - BMT and CSIA, as well as FOKS tools adopted to FUA scale.	S.O.3.3 Number of pilot actions implemented for the improvement of environmental quality in functional urban areas	1,00 05.2019	



**Azione pilota dimostrativa sulla valutazione dei processi di attenuazione naturale e sulla sua applicabilità alla scala FUA come opzione per bonificare l'inquinamento delle acque di falda ad opera degli idrocarburi clorurati.**

Campagne di monitoraggio periodico attraverso campioni prelevati da piezometri preesistenti e nuovi allo scopo di analizzare composti specifici, includendo l'applicazione di strumenti innovativi - BMT e CSIA (Compound specific isotope analysis).

Activity title Implementation of Pilot Action 4: Assessment of NA potential as a remediation option in Parma FUA (IT)	Start date 11.2016	End date 05.2019	Indicative budget 144.831,80
<b>Deliverables for activity A.T2.4</b>			
Deliverable D.T2.4.1	Description of deliverable Development of conceptual and numerical model based on existing data and on CSIA analysis: Analysis of the contamination of the GW body based on existing data and on a new monitoring campaign; implementation of the data collected into a GIS.	Delivery month 06.2017	Quantification/target 1,00
Deliverable D.T2.4.2	Description of deliverable Results from 1. analysis of the numerical model results aimed at optimizing the monitoring network (identification of the existing monitoring wells and of the required ones); 2. with associate partners and FUA authorities.	Delivery month 06.2017	Quantification/target 1,00
Deliverable D.T2.4.3	Description of deliverable Design of new monitoring wells to be located in a area chosen after the results of the preliminary analyses, procurement process and obtaining permits	Delivery month 08.2017	Quantification/target 1,00
Deliverable D.T2.4.4	Description of deliverable Drilling of boreholes, analysis of logs and development of 6 monitoring wells (about 25 m deep).	Delivery month 12.2017	Quantification/target 1,00
Deliverable D.T2.4.5	Description of deliverable Periodical Monitoring of the Natural Attenuation	Delivery month 04.2019	Quantification/target 6,00
Deliverable D.T2.4.6	Description of deliverable Improvement of the groundwater flow and transport model in order to keep into account all the data collected during the monitoring period.	Delivery month 04.2019	Quantification/target 1,00
Deliverable D.T2.4.7	Description of deliverable Technical description and documentation of the procedures applied to monitor the NA processes. Analysis and comments of the results.	Delivery month 05.2019	Quantification/target 1,00



# AZIONE PILOTA: PARMA



Investment specification (to be completed for each investment exceeding EUR 15.000 total costs)

WP Nr.	WP title	WP start date (month)	WP end date (month)	WP budget
13	Drilling of boreholes for Natural Attenuation potential assessment in Parma FUA	08.2017	01.2018	32.200,00
Partner	WP responsible partner	8 Parma Municipality		

Partner's involvement

8 Parma Municipality, PP, EMA

Technical description of the investment

Please describe the foreseen investment including a technical specification and quantification.

The investment consists of drilling 6 new boreholes to characterize the Natural Attenuation (NA) inside the FUA. The new boreholes will be placed in agreement with associate partners and FUA authorities in order to improve the existing monitoring network and to avoid duplication. The new boreholes will be drilled in the shallow aquifer at a depth of about 25 meters after the evaluation of the drilling logs. The boreholes will be equipped by a PVC case and screened in the last 10-25 meters. The characterization boreholes will be protected by cases with lock.

La parte infrastrutturale del progetto consiste nella realizzazione di n. 6 nuovi piezometri per verificare l'Attenuazione Naturale (NA) all'interno della FUA.

Posizionati in accordo con i partner associati e gli Enti territoriali in modo da incrementare la rete di monitoraggio già esistente.

Saranno eseguiti nel livello acquifero superficiale ad una profondità di circa 25 metri, dopo aver valutato attentamente i log di perforazione.

Saranno protetti con chiusini eventualmente carrabili e lucchetto.



# AZIONE PILOTA: PARMA



## Justification Please explain

- how the investment will contribute to achieving the project objectives and results
- the transnational relevance of the investment
- who is benefiting (e.g. partners, regions, end-users etc.) from the investment and in which way

## Please clarify further

- which problem the investment tackles
- which findings you expect from it
- how it can be replicated or transferred to organisations/regions/countries outside of the current partnership

## Please also indicate the thematic work package to which the investment is linked.

The groundwater body of the FUA extends upstream to the Apennines Mountains and downstream to the Po River; pollutants (such as chlorinated hydrocarbons and nitrates) originate from old industrial activities, intensive agriculture, livestock farming: are detected in the urban area, and in the hinterland; contamination crosses the administrative boundaries of the municipality and move across the FUA following the Groundwater flow. Pollutants contaminate the aquifer used for the city aqueduct or private wells. These pollutants and risks are a common problem in Central Europe, but their remediation is a complex both technically, financially and in frame of regulations, because they cross the administrative boundaries, so all investments results will contribute to transnational added value as part of Management Strategy. The FUA of parma, will enrich the tools and strategies developed in AMIIGA; together with the other investments and pilot actions, it will contribute to create an innovative set of tools and methodologies that will help public decision makers in Italy and in Europe to take well informed decisions and improve the management of environmental services and, ultimately, impact the quality of environment and life in their regions. From the investment we expect to scientifically understand when and how we can use NA as a remedial tool, which financial and non-financial resources are needed to characterize NA. The investment will benefit environment decision makers, political representatives, technicians, Regional Public Authority Emilia Romagna: the environment department and its group on chlorinated hydrocarbons; AMIIGA partners and associated partners; AMIIGA Regional Implementation Groups (WP3); water public services; local and regional authorities of the FUAs in Central Europe regions and beyond . The investment results will be embedded into transnational project activities in frame of WP 2 (A.T2.4) and WP3 (A.T3.1, A.T3.2, A.T3.3, A.T3.4).

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Location of the investment	Location Please indicate the location of investment at NUTS level and provide a short explanation
	The investment will be in the urban area of the FUA, a residential and services area that hosted industrial and craft activities until about ten years ago. We choose this area because we are aware of the level of pollution and the risks for the central urban area and the hinterland of the FUA. We currently monitor a small area but the investment will cover a much larger area, in the South-West of the city, both inside and outside of the municipality boundaries. The focus is not only the transformation of brownfield; it is also to increase the quality of life of the citizens by creating a better environment, by reducing the pollution of the FUA (residential, green, services etc) and to identify possible pollution sources still existing.
Risks associated with the investment	Please describe any potential risks associated with the investment, go/no-go decisions, etc.
Please also indicate if the investment might have any potential negative effects on the environment. If yes, please specify which mitigation measures are foreseen.	The risks associated with the investment are very low and might be associated to bad maintenance of the piezometers and natural events (earthquakes, floods etc). The investment will not have negative effects on environment, neither above ground, nor underground. The investment will be in compliance with current environmental policies and legislation (such as environmental regulation 152/2006 and others).



# AZIONE PILOTA: PARMA

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**Investment preparation**  
*If applicable, please specify the technical requirements and permissions (e.g. feasibility study, building permits) necessary for the realisation of the investment according to the respective national legislation. Please indicate if they are already available or their expected time of availability.*

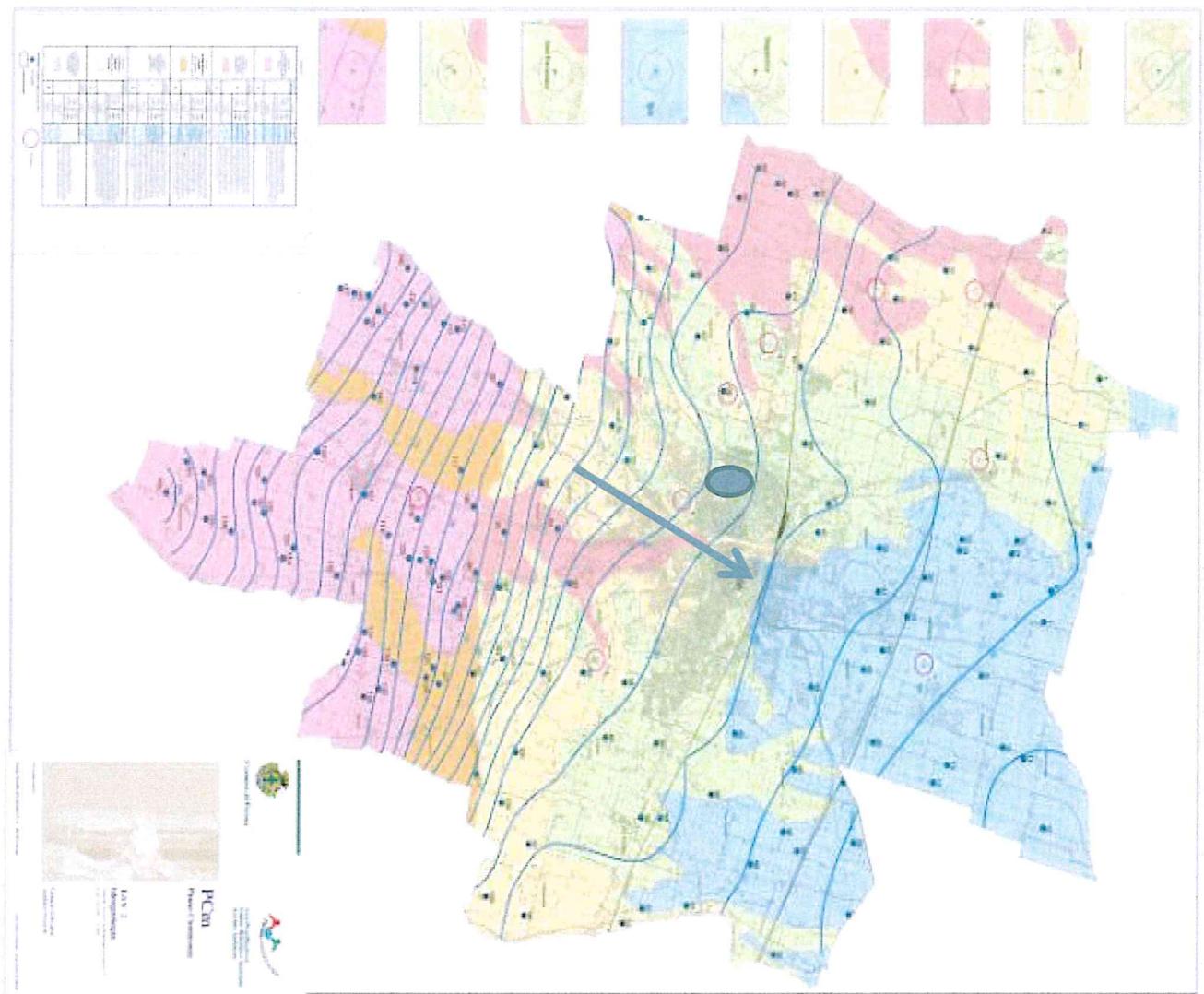
Apart from the preparatory actions as per WP2 (activity A.T.2.4), the investment does not require permissions, as it will be implemented in public areas under Municipality control or Municipality ownership. In order to follow transparency and co-operation good practices, we will: 1) inform the Regional Public Authority and send them the technical specifications of the monitoring wells (see Regional regulation no. 41 of 20 November 2001 - Regulation governing the procedure for granting public water, Article 17 - Drilling aimed at controls). 2) We will discuss the time-plan of the investment and its results with the bodies that participate in the 'services conference' (see title V, section IV, legislative decree 152/06).

## **Ownership and durability**

*Who owns the site where the investment is located? Who will retain ownership of the investment after the end of the project?  
How will the investment be further used after the project end? Who will take care of maintenance of the investment?  
Please describe concrete measures (including e.g. institutional structures, financial sources etc.) taken during and after project implementation to ensure the durability of the investment.*

The investment site is owned by the Municipality of Parma, who will also retain its ownership, and it will use the wells for the future monitoring of the groundwater body - this is a task that the Municipality has to carry out as public service. The characterization boreholes do not require periodical maintenance. Only the external cases with lock have to be maintained efficient, and the Municipality will do it. The boreholes will be incorporated into the wider monitoring network of the groundwater and will be sampled periodically. The Regional Agency for Environment too is already interested in using the wells.

# PARMA: AREA DI STUDIO

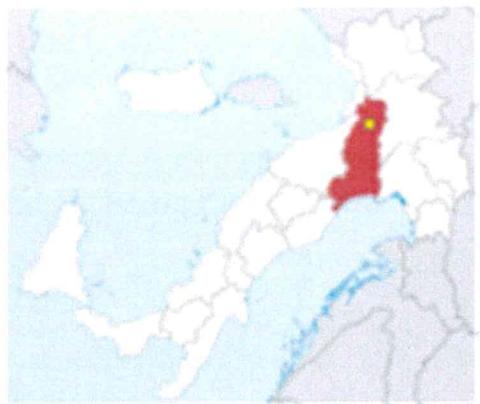


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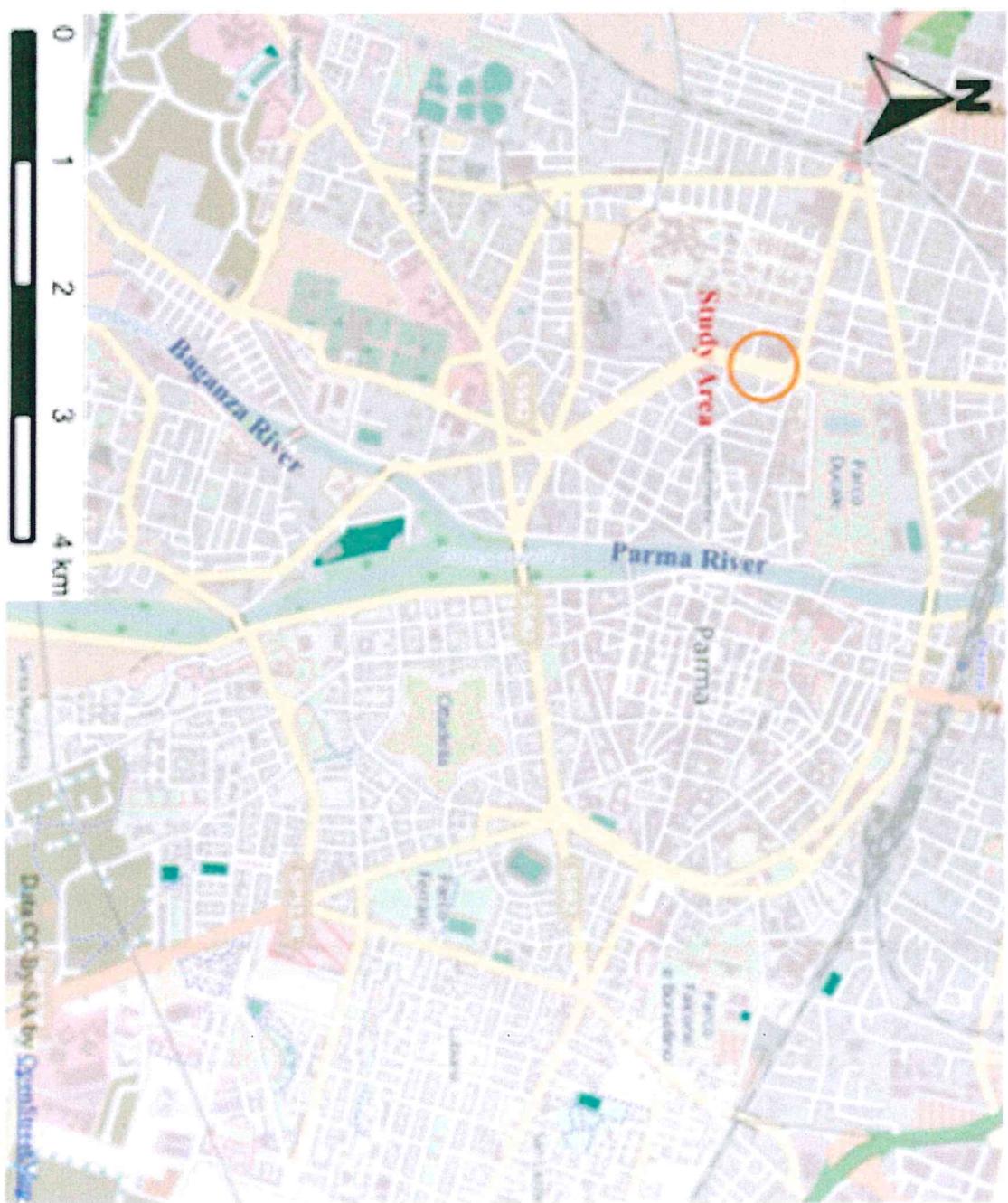
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# PARMA: AREA DI STUDIO



Situata nella zona  
urbana del  
Comune di Parma

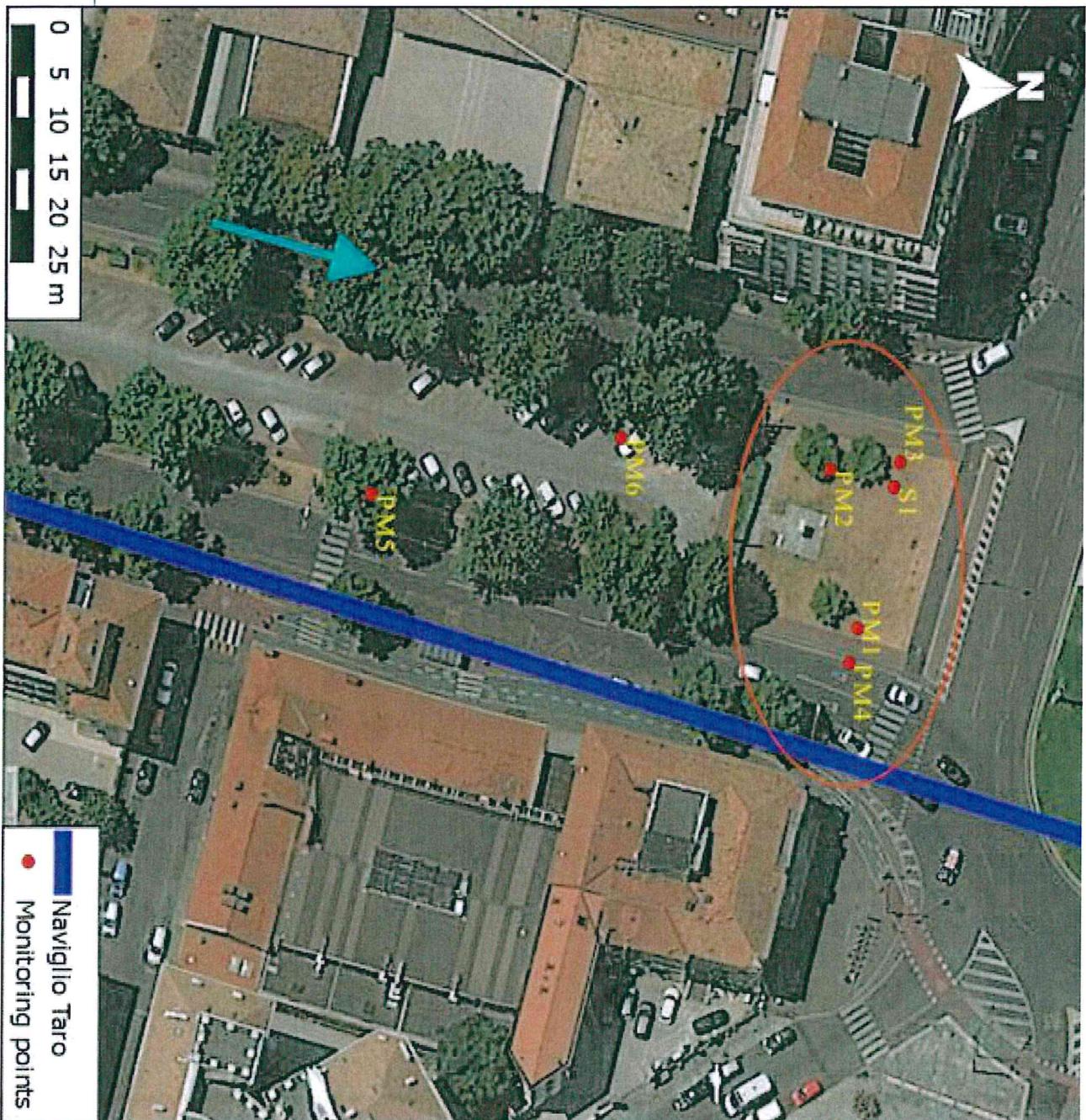


# AREA DI STUDIO: SANTA CROCE

Progetto di monitoraggio delle qualità acustiche e ambientali



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# GEOLOGIA

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Depth

Material

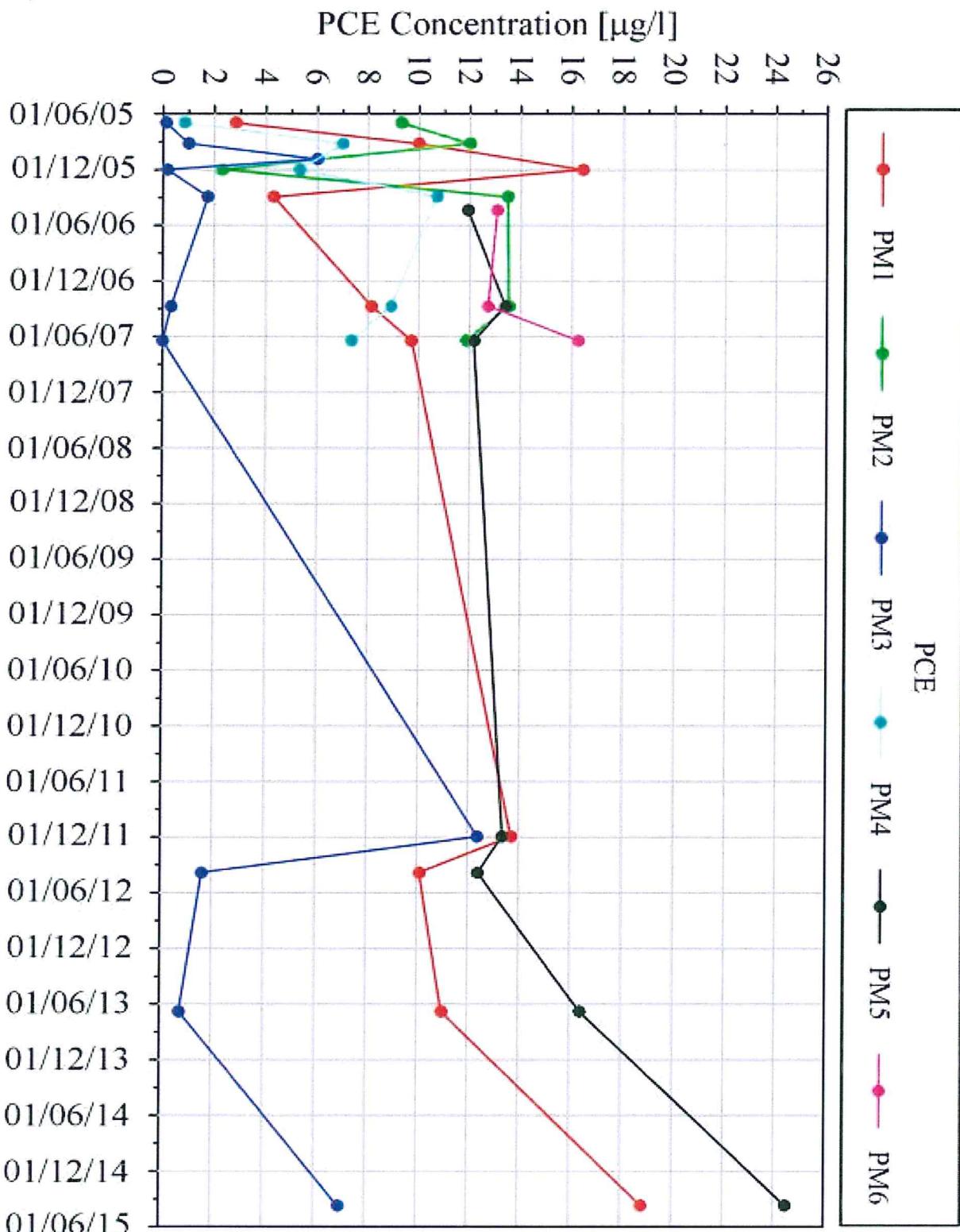
Material	Depth
Backfill	5
Silty Clay	10
Silty Sand	15
Gravel and Sand	20
Clay	25
Gravel	30
Clay	35
Gravel	40
Clayey Gravel	45
Gravel	50
Gravel with Clay	51.00

Well P700  
250 m downstream

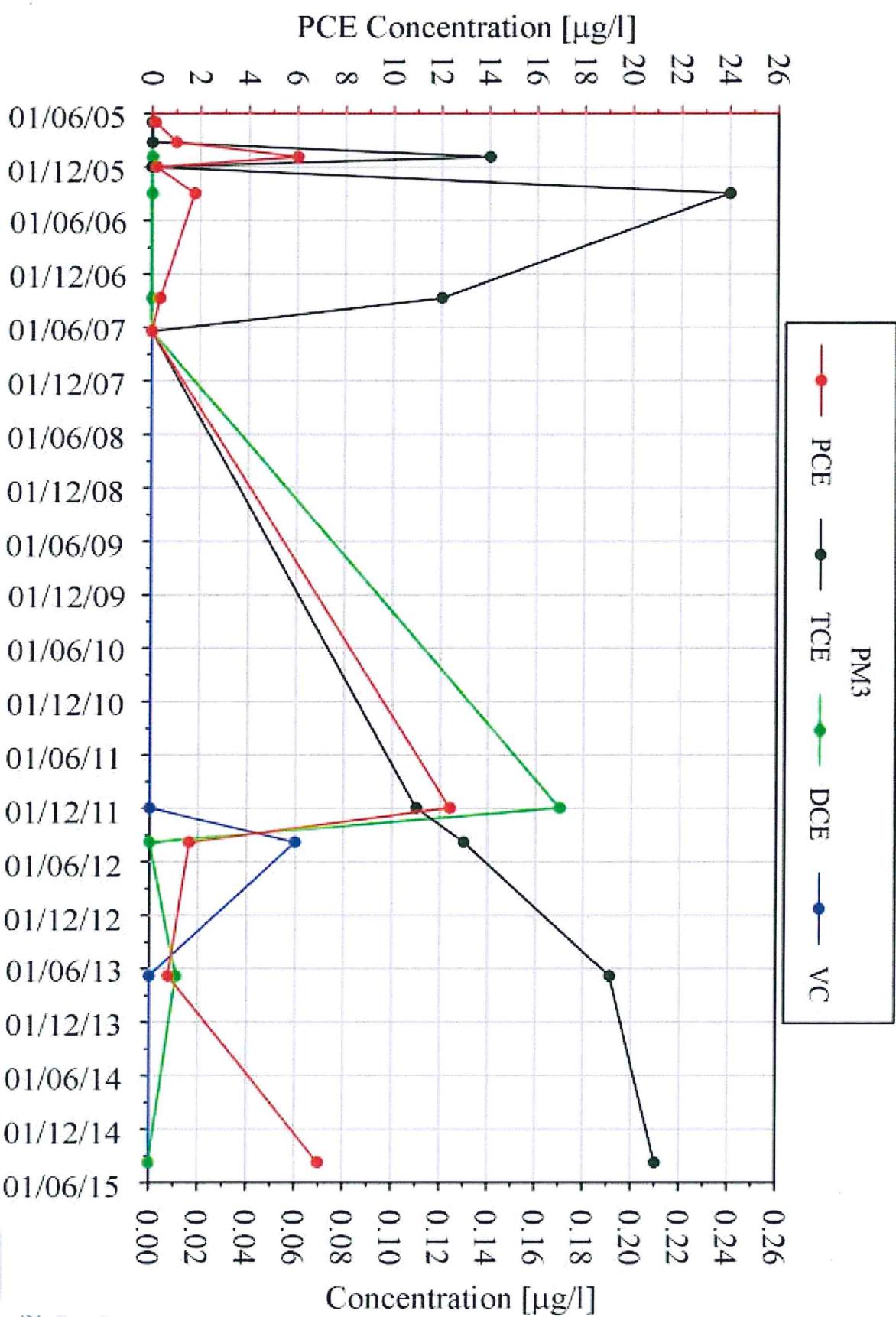
# AREA DI STUDIO: SANTA CROCE



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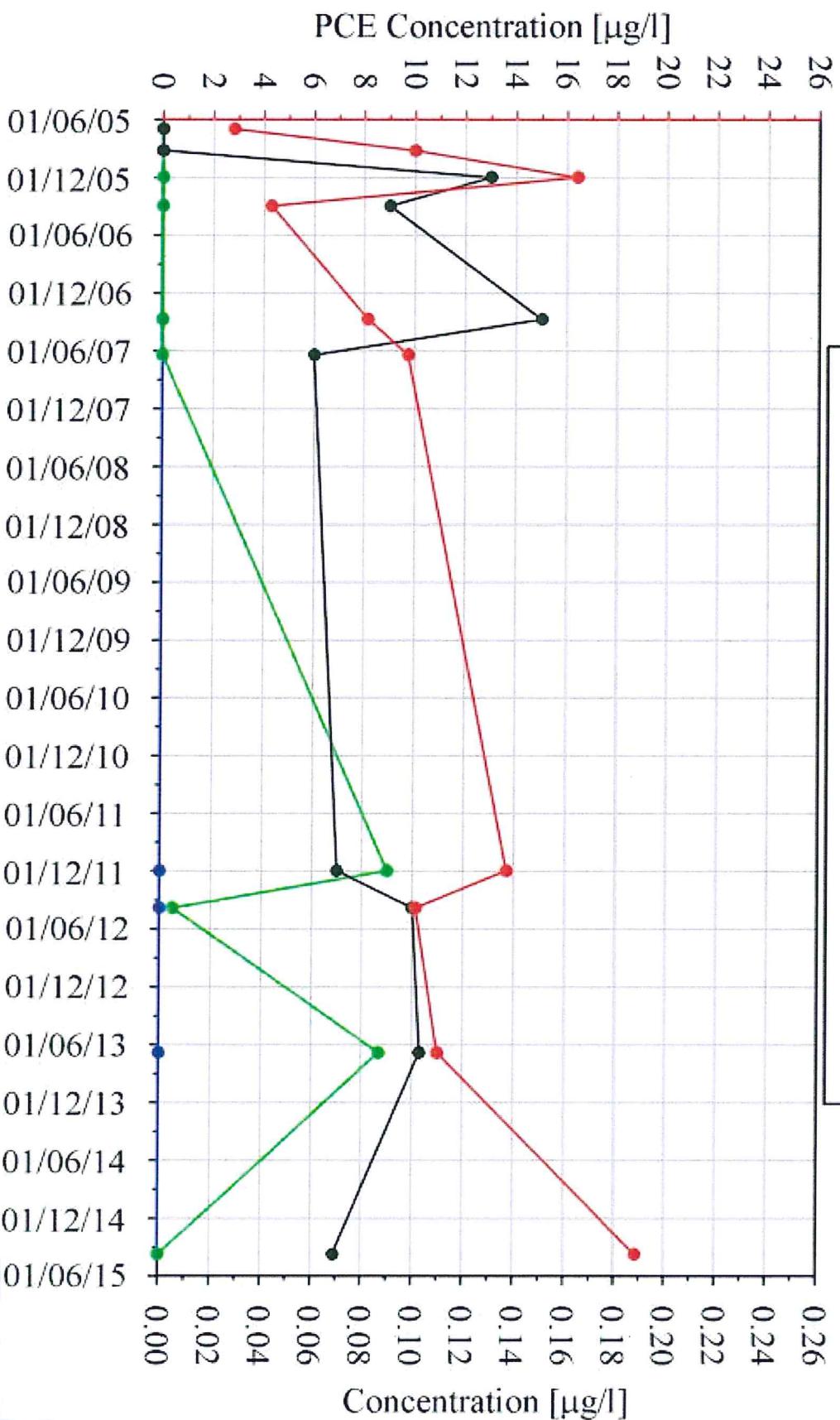


# AREA DI STUDIO: SANTA CROCE

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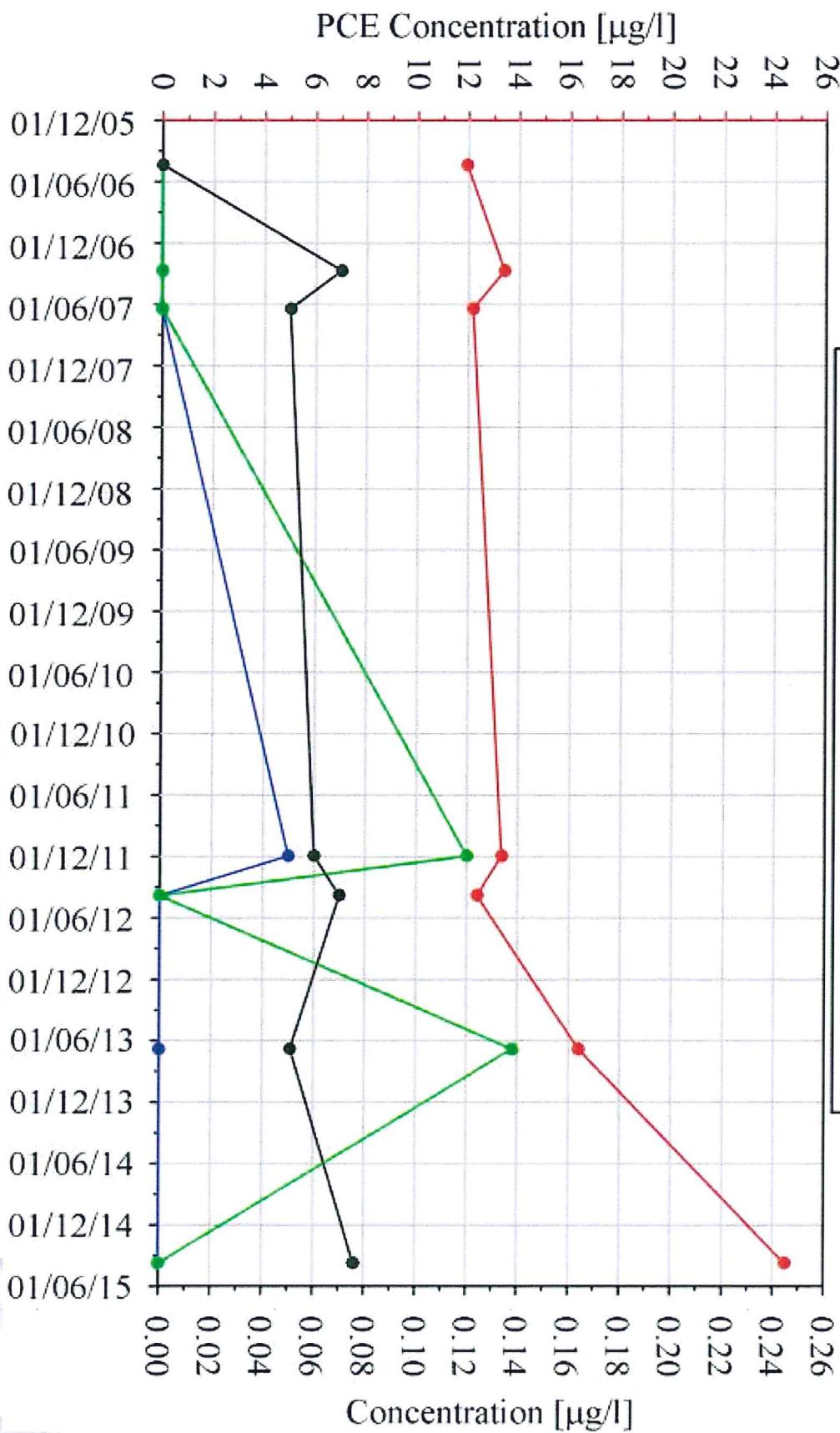


# AREA DI STUDIO: SANTA CROCE



TAKING COOPERATION FORWARD

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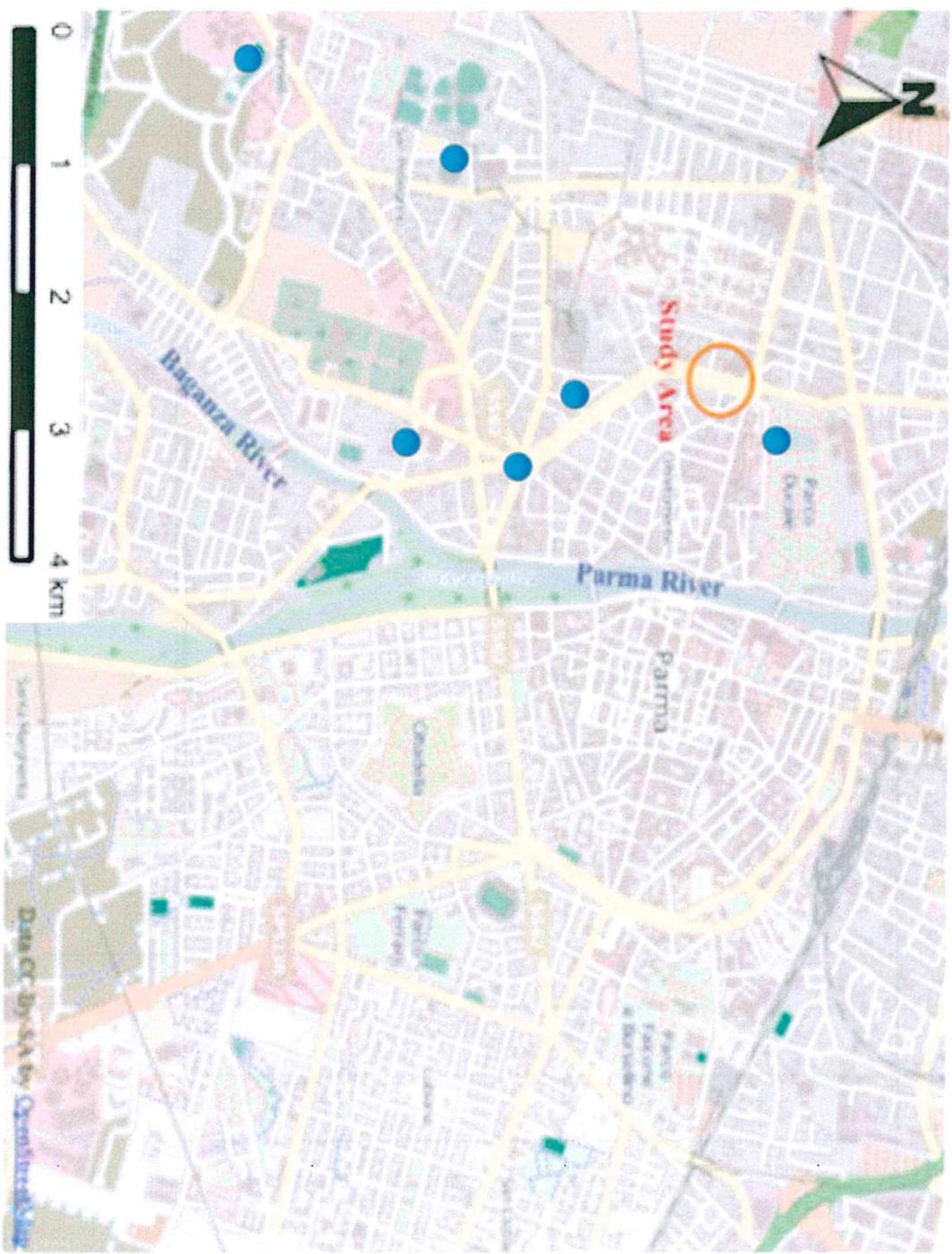
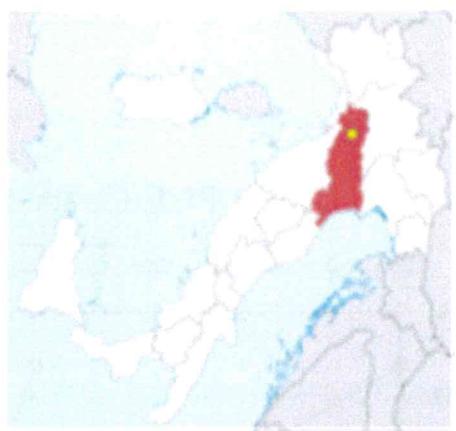


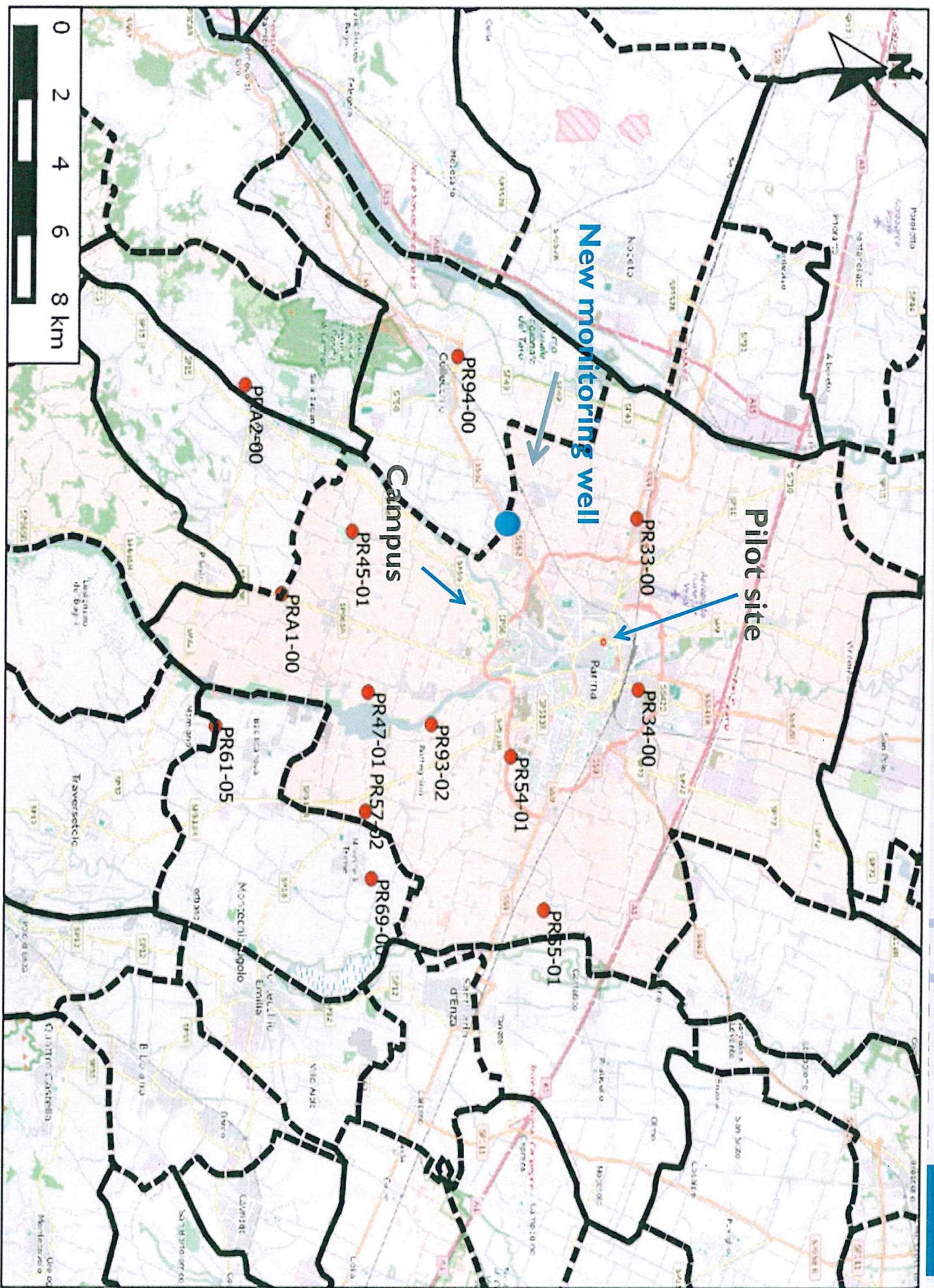
# NUOVI PIEZOMETRI: POSSIBILE POSIZIONE

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- Implementare la conoscenza sulla contaminazione del sito
- Identificare la diffusione del pennacchio (plume) di inquinanti
- Monitorarne l'evoluzione
- Ricercare tecnologie di bonifica non invasive
- Identificare la/e sorgente/i del plume e i relativi rilasci

# LINEA TEMPORALE PER ESECUZIONE INVESTMENT

**■ Aprile 2017: Affidamenti incarichi per esecuzione lavori e servizi**

**Luglio 2017: Consegnalavori**

**Settembre 2017: Inizio realizzazione piezometri**

**Gennaio 2018: fine lavori**

Activity title Activity A.T2.4	Deliverable title Report from Site characterization	Description of deliverable Development of conceptual and numerical model based on existing data and on CSIA analysis. Analysis of the contamination of the GW body based on existing data and on a new monitoring campaign; implementation of the data collected into a GIS.	Start date 11.2016	End date 05.2019	Indicative budget 144.831,80
Deliverables for activity A.T2.4					
Deliverable D.T2.4.1					Quantification/target 1.00
Deliverable D.T2.4.2					Quantification/target 1.00
Deliverable D.T2.4.3					Quantification/target 1.00
Deliverable D.T2.4.4					Quantification/target 1.00
Deliverable D.T2.4.5					Quantification/target 1.00
Deliverable D.T2.4.6					Quantification/target 1.00
Deliverable D.T2.4.7					Quantification/target 1.00





**MARCO GHIRARDI**  
Settore Ambiente e Mobilità  
Servizio Presidio attività estrattive e qualità acque



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