



D.T 2.8.1

Pilot Action: Stuttgart Functional Urban Area

Version 2
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1. Pilot Action FUA Stuttgart-Feuerbach

Stuttgart, State Capital of Baden-Wuerttemberg, is the centre of a densely populated area in south-western Germany. In Stuttgart about 609.000 inhabitants (31.12.2016) live within 207 km², whereof 50 % are settlement areas. The Stuttgart Region with its 2.7 million inhabitants generates a gross domestic product of about 124 billion Euros which is comparable to the state of Hungary.

The districts in the north of Stuttgart are characterised by a dense agglomeration of companies. Global players as well as small businesses contribute to the economic power of this area. Especially the district Feuerbach has a long tradition of many producing industries. Thus the area is handicapped by serious soil and groundwater contamination generated over decades.



Figure 1 City district of Feuerbach.

Nowadays the district of Feuerbach is densely populated and especially the eastern part is heavily industrialised. For each of the 29.000 inhabitants, about 1.3 employees are working in Feuerbach. In the central part of the district (500 ha) more than 400 contaminated sites are located, from which about 140 sites are known or suspected to discharge CHC in the groundwater. Very long and uncontrollable plumes are generated by CHC compounds in the shallow aquifers. Often diffuse contamination afflicts the groundwater bodies and it is not possible to assign the contamination to the responsible polluter.

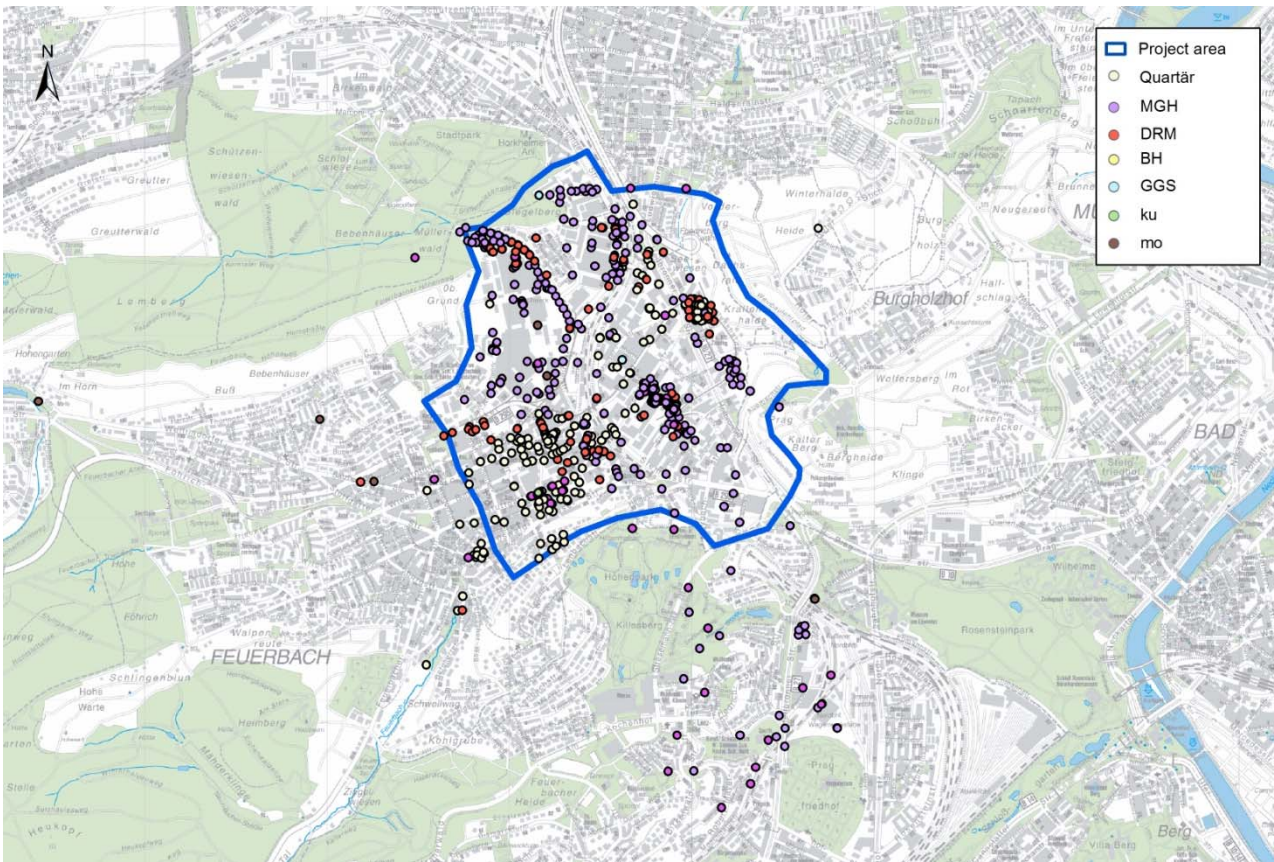


Figure 2 Site map with groundwater wells in the city district of Feuerbach.

A lot of single site investigations and remediations took place since 1984 in the industrial area of Feuerbach. Therefore additional field studies, a hydrogeological and a numerical model were compiled in course of the INTERREG projects MAGIC (2005-2008 in INTERREG IIB CADSES) and FOKS (2009-2011 in INTERREG IVB CENTRAL EUROPE) to characterise the groundwater situation in the industrial area of Feuerbach and to identify the most serious polluters within this area. 682 groundwater wells built in different aquifers are located in the district Feuerbach, see figure 2. Figure 3 shows the complex layered geological build-up in the working area.

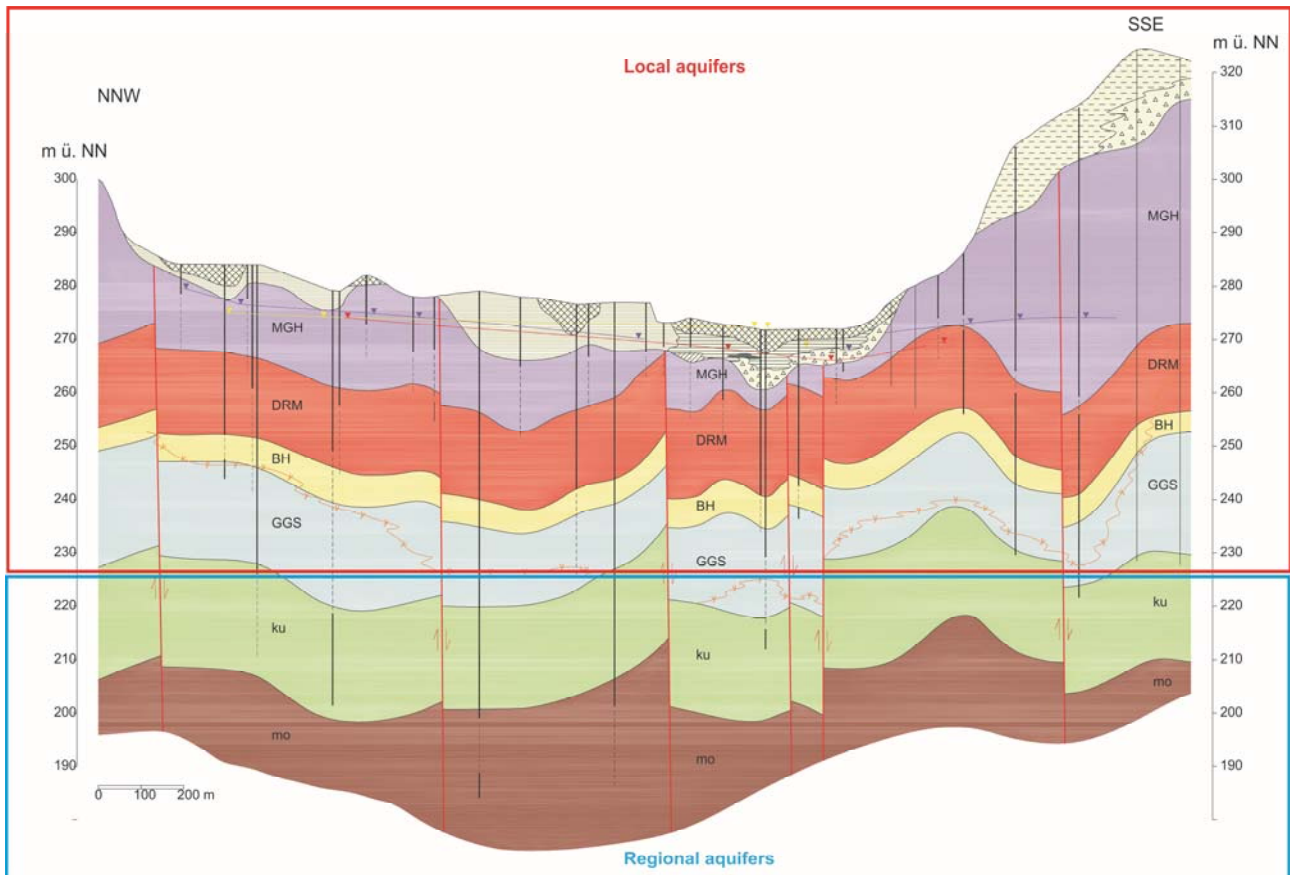


Figure 3 Geological build-up with the delineation of the FUA aquifers.

Within the AMIIGA project, strategies and methodologies to handle the diffuse contamination and the contamination plumes will be developed. In contrast to the former investigations which were focused on the shallow aquifers (see red box in figure 3) with local distribution, the main goal within the AMIIGA project will be the characterisation of the hydrogeological situation, the contamination transport and the hydrochemical processes in the deep aquifers (see blue box in figure 3).

The assumed groundwater flow direction in the deep aquifer „Upper Muschelkalk“ (mo) is directed in the project area of Feuerbach from the west to the east. As the water of the Upper Muschelkalk originates in the rural district of Ludwigsburg in the west of Feuerbach, this area needs to be considered in the delineation of the functional urban area (see brown outline in Fig 4). Therefore all responsible and stakeholders across administrative borders need to be involved to develop the groundwater management plan for Feuerbach.

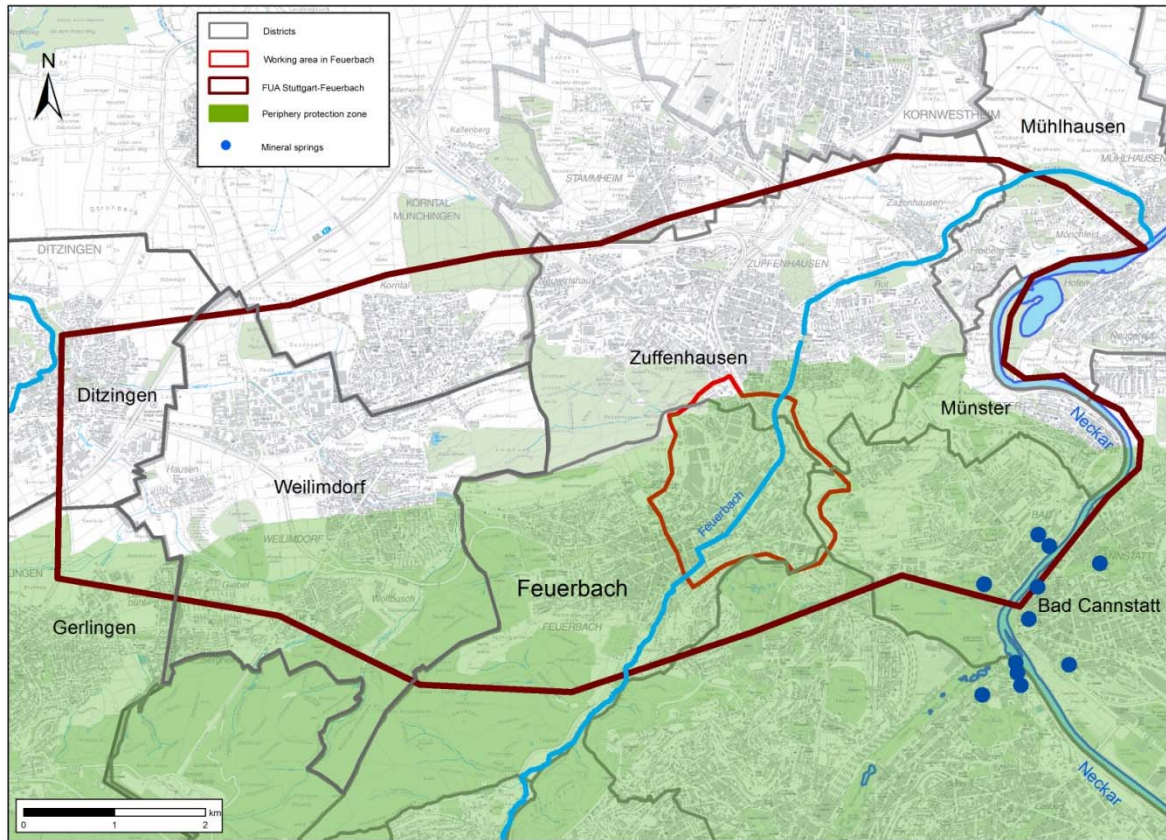


Figure 4 FUA and project area Stuttgart-Feuerbach, the mineral water springs of Stuttgart and their recharge area in green.

In the LIFE-project MAGPlan in which the Nesenbach valley south of Stuttgart-Feuerbach was investigated, it was assumed that the regional flow system of Stuttgart-Feuerbach is directed to the river Neckar, not affecting the mineral springs of Stuttgart. Nevertheless, the impact of the contamination plumes of Stuttgart-Feuerbach on the mineral water aquifer needs to be clarified.

An example of CHC plume south of the AMIIGA FUA endangering the mineral springs in Stuttgart is shown in figure 5.

Figure 5 CHC plume endangering the mineral springs of Stuttgart.

The following activities are planned in FUA Stuttgart-Feuerbach:

- × Data acquisition for hydraulic and contaminant characterization of shallow (local) and deep (regional) aquifers shall be performed, together with the measurements of the groundwater level and sampling campaign.
- × Hydro-geological and numerical models shall be updated in order to establish the location of the new groundwater wells and an integral monitoring network.
- × Four groundwater monitoring wells in the shallow aquifers and two groundwater monitoring wells in the deep aquifers shall be drilled to optimize the existing groundwater monitoring network.
- × Six immission pumping tests on the new wells shall be implemented and evaluated to identify the contamination flow pathways.
- × The integral monitoring network shall be established to observe the contamination situation on the long term in Feuerbach.
- × Sampling campaign and analyses of groundwater samples shall be performed to survey the effectiveness of the integral monitoring network and to identify the potentials of natural attenuation processes of CHC.
- × A groundwater management plan for the Stuttgart-Feuerbach shall be developed to cope with the groundwater contamination in Feuerbach and to achieve the better groundwater quality in a reasonable time.