

Characterization of groundwater dynamics to identify the risks of flooding of the sewerage network of the urban communities of Lens-Liévin (northern France).

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The interactions between groundwater and the sewerage networks of the Lens-Liévin urban communities, located in the north of France, locally lead to non-compliances in the operation of the network and the wastewater treatment plants questioning the city's economic development policy. Indeed, the infiltration of groundwater inflow in the sewerage network could be the cause.

Based on the piezometric measurements carried out in 2022, the surface elevation of the groundwater table is carried out using a kriging approach. The comparison of altitudes between network position and piezometry made it possible to identify the pipes most at risk of the infiltration of groundwater inflow and correspond to those indicated as non-compliant by network managers according to the national decree. Outside this period, the network vulnerability indicators are defined this time based on simulated piezometry by a 3D hydrodynamic model of the chalky hydrosystem (MARTHE code) established in transient state. For two past extreme situations, the network would have been flooded at 1.20% in the dry period (1997) and up to 8.30% in the wet period (2001) highlighting the existence of a part of the network systematically flooded.

The use of the hydrodynamic model according to different prospective scenarios makes it possible to anticipate the actions to be deployed on the network to guide management and adaptation solutions. However, a modeling methodology taking into account the feedback between the dynamics of the groundwater and that of the flows passing through the networks remains to be developed.

Keywords: sewerage network, aquifer, groundwater, groundwater inflow, piezometry, hydrodynamic modelling, urban hydrogeology.