



## **Minimising street work disruption by mapping cavities derived from 3D GPR-data: a new sewerage project in Torrente (Valencia, Spain)**

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Ground penetrating radar is usually employed for non-destructive detection of cavities in karst areas and road maintenance. This paper describes the inspection for cavity detection in a street located in Torrente (Valencia, Spain) where a new sewerage project was planned.

Torrente population growth (more than 80,000 inhabitants last year) has caused urban development southwards from its downtown. According to municipality geologic configuration, new urbanized areas are located in mountains composed of limestone with presence of karst systems. During excavation work for a sewerage system installation, a 4 x 2 x 1.5 m shallow cave was found in one planned street. For this reason, digging activities were stopped and a GPR survey was carried out on the street. A 1x1 m grid was collected using a GSSI SIR-3000 equipment. A 400 MHz frequency antenna was used for reaching 2.5 m approx. depth, attending the characteristics of the discovered cave and the excavation project depth. GPR records were calibrated in situ, thanks to the unearthed cavity.

The 3D GPR-data interpretation mapped several caves only on one side of the street. The detected cavities coincided with the sewerage system layout. These underground spaces were isolated from each other, as small individual karst caves. The outcomes of this study allowed the modification of the sewerage project. Therefore, the sewerage system layout was moved to the other side of the street where no cavities were detected with the GPR survey.

GPR is proved to be an efficient tool to be taken into consideration by civil engineers and architects for designing new infrastructures (e.g. sewerage systems) in urban planning areas. We conclude GPR helps minimising cost, time and inconveniences to neighbourhood during excavation works, especially in cities.