CASE STUDY

continuous monitoring of gas for new development

project **summary**

EPG were appointed to design a suitable ground gas investigation and carry out a detailed quantitative gas risk assessment, incorporating continuous ground gas monitoring, flux chamber testing, and data analytics. These formed part of a comprehensive evaluation which also considered historical records, previous ground investigation findings, and earthworks data.

EPG demonstrated that the elevated gas concentrations and flow rates in wells were not representative of the actual gas risk. This was approved by the NHBC and the development was able to proceed without the need to fit costly gas protection measures. This was a huge saving for the client and the work carried out by EPG essentially paid for itself and the project was completed sooner than anticipated.

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the **challenges**

A large former quarry was identified for development as part of a residential masterplan. Land forming earthworks using original overburden materials had already been completed been completed. On the first phase of development, elevated carbon dioxide was found in monitoring wells and as a result, gas membranes were installed in the buildings. Using the simplistic Gas Screening Approach the site would have a Gas Screening Value of 2.3l/h which would classify the site as Characteristic Situation CS3, with a maximum methane concentration of 44% in deep wells and maximum carbon dioxide concentration of 18%.

The challenge was to demonstrate that the gas in the wells did not represent a risk to the proposed buildings and that it was being generated at a very low rate by widely occurring natural processes and thus could not cause large surface emissions.

the **solution**

A multiple lines of evidence approach was used to investigate the ground gas risk on the site, including earthworks compliance data (TOC testing). Continuous monitoring in monitoring wells at different depths was completed. A key element of the data obtained is that each reading is linked to weather data from a local station. This allows exploration by the consultant of the relationships between rainfall, atmospheric pressure, wind speed, etc and the gas parameters.

The continuous monitoring data collected by GasfluX units was analysed and provided evidence that the gas in wells was caused by infiltrating rainfall during heavier rainfall events that resulted in biological oxidation of small quantities of organic material that are present in almost all soils. There was no risk of carbon dioxide emissions occurring from the ground and affecting buildings. EPG used the data analytics hosted on their web portal to produce correlation plots, heat maps and 1D partial dependency models. When combined with the other information sets for the site, it helped provide multiple lines of evidence, all showing no risk from ground gas. Methane present in deeper wells was shown to be partitioning from groundwater and was not migrating through the fill material to the ground surface.

Further evidence was provided by correlating gas monitoring in wells with surface emissions tests carried out using flux chambers. A multiple lines of evidence approach was used to investigate the ground gas risk on the site, including earthworks compliance data (TOC testing). Continuous monitoring in monitoring wells at different depths was completed. A key element of the data obtained is that each reading is linked to weather data from a local station. This allows exploration by the consultant of the relationships between rainfall, atmospheric pressure, wind speed, etc and the gas parameters.

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the **results**

- On the basis of a simple screening assessment using Gas Screening Values the site would require gas membranes in the buildings. EPG's analysis of continuous monitoring and other data including use of the Ambilytics data analytics platform demonstrated that there was no risk of gas emissions to buildings. This removed the need to install gas protection membranes in the development, which provided a significant cost saving.

- The outcome has also rationalised the requirements for verification gas monitoring in future phases of the development, thus avoiding delays between completion of earthworks and acceptance by regulators.

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