



Yew Tree Farm Mine gas risk assessment

project summary

A moderately sized housing developer approached EPG to assist with a planned residential development site which appeared to have a potential mine gas risk.

A previous site investigation undertaken by a 3rd party consultancy resulted in the designation of Characteristic Situation CS4 following a programme of spot gas monitoring. A designation of CS4 shows the site to be potentially undevelopable for residential housing, so the development was at risk of falling through.

Following the initial reconnaissance through the 3rd party data captured by EPG, several uncertainties were present which were considered likely to be over inflating the gas risk. An example of this was that the previous gas monitoring had installed gas monitoring wells into the historic mine workings below the site, creating an artificial pathway from the workings to the ground surface which did not appear to be present naturally.

Designating a characteristic situation in a mine gas risk assessment is also not best practise, thus the risk assessment needed to be full overhauled and supplemented with complementary lines of evidence to establish a truer to life representation of the mine gas risk on the site.

the challenges

The key challenge was designing a cost-effective strategy to gather additional data and supplement the previous investigation. Fortunately, existing monitoring wells remained on site, although spot data indicated that flooding was common and made gas readings unreliable.

After reviewing all data, four wells were selected for continuous monitoring. Two were installed into the workings to capture potential worst-case gas flux and allow comparison with two shallower wells. If elevated gas levels were recorded only in the deeper wells, it would indicate that the workings might act as an artificial pathway for gas movement.

Continuous groundwater monitoring within the workings would have been ideal, but the narrow diameter of the wells made this impractical. As a result, some uncertainty was introduced to the gas model, particularly around potential periodic flooding and unflooding, which was accounted for conservatively in the overall risk assessment.

the solution

The combination of the continuous monitoring from the two wells screening the workings, which showed high gas flux, when compared to the two other shallow monitoring wells, shows little flux was occurring in absence of the artificial pathway created by the monitoring wells placed within the workings.

This was further supplemented by the flux chamber survey, which was undertaken during a significant pressure drop, which was identified through the continuous monitoring to be the key driver in gas flux in the wells screening the workings; no elevated concentrations of carbon dioxide were encountered at the ground surface, including in proximity to the wells screening the workings. Flux chamber tests were also undertaken over untreated mineshafts on site, which also showed negligible flux.

Further investigation into the geology of the area and data from the site investigation also revealed a fault across the site, which restricted coal bearing strata to approximately one quarter of the overall sites footprint. As no workings were present across the majority of the site, no mine gas risk was deemed present across the majority of the site.

the results

The primary goal of the assessment was to allow the development project to proceed, as the existing designated ground gas regime essentially prevented the development from progressing as a residential development. Cost was also a factor, as a significant site investigation had already been undertaken, and the client did not have the financial appetite to undertake substantial further investigation. (As outlined in CL:AIRE guidance written by Steve Wilson: Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention.)

A combination of continuous gas monitoring and a supplementary flux chamber were designed by EPG to supplement the existing site investigation data.

While EPG was confident that no risk from mine gas was present, given the uncertainty for flooding and unflooding in the workings, the area of the site underlain by coal bearing strata was designated as requiring some gas mitigation be incorporated into the design of the residential properties. No gas mitigation measures were required across the majority of the site where coal bearing strata was not present.

Following EPGs investment, the project went from undevelopable for residential properties, to only a small fraction of the properties requiring any gas mitigation at all.