

Consultation Response from: KC Environmental Health (Pollution & Noise Control)
2019/93903 - 122A Laund Road, Salendine Nook, Huddersfield HD3 3TY
Erection of one dwelling and associated works
**Date Responded:
19 Nov 2020**
**Responding Officer:
Richard Hume &
Natalie Heaney**
**Responding Ref:
WK/202004024**

This application relates to a single building that has already been constructed under a previous planning permission for a larger development but contrary to a condition of that permission relating to the protection the future occupiers of the development from contaminated land risks (including ground gas). In our previous responses dated 13 & 14 Feb, 09 Apr and 22 May 2020 we have considered information submitted by the applicant, in particular regarding the ground gas situation at the site. Each time we have considered that the applicant has failed to provide satisfactory evidence to clearly demonstrate that the building, which has already been constructed but without any specific ground gas protection measures, does not need any such protection measures.

An Updated Ground Gas Risk Assessment by Sub Surface dated Sep 2020 (ref: NE3941A) has now been received. The assessment reviews previous reports, in particular the ground gas monitoring data and also details 4 additional gas monitoring visits over an 8-week period between June & Aug 2020. The latest monitoring was undertaken at two previously installed monitoring wells. The additional monitoring finds no elevated levels of methane but does detail elevated levels of carbon dioxide.

The report considers the measured ground gas flow rates and the lack of expected correlation of these with the atmospheric pressure. It considers that the flow rates may be being affected by other multiple factors such as changes in groundwater level and variations in wind speed and notes some high flow rates associated with possible rising water table. It considers that the source of the carbon dioxide is microbial activity. The report considers the borehole hazardous gas flow rate (Q_{hg}) as detailed in BS8485 and calculates this to be 0.016 L/h and therefore considers it to be within the range of characteristic situation 1 (CS1). It supports this conclusion by referring to the previously submitted monitoring results from the one-day spot monitoring and the continuous monitoring.

The report also considers that there is no justification for considering the site to be characterised as CS2 just because the carbon dioxide levels exceed 5%. It bases this on the source of the carbon dioxide as being due to microbial activity and not from shallow coal seams, made ground or organic deposits.

The report also states that the building is underlain by 1.5 to 1.8m of low permeability cohesive strata and consequently that the risk of carbon dioxide ingress into the property is very low. The report does however acknowledge that the carbon dioxide levels from their monitoring were possibly following an upward trend and therefore recommends extending the monitoring for a further two months. It also considers alternative continuous monitoring within the closed and undisturbed property for one week including a period of falling air pressure with sample analysis at the beginning and end of the monitoring.

Comments

Guidance in BS 8485 2015+A1-2019 Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings and CIRIA C665 - Assessing Risks Posed by Hazardous Ground Gases to Buildings both advise that a very low hazard potential classification (CS1) is appropriate when a gas screening value (GSV) is less than 0.07 L/h or carbon dioxide concentration are less than 5%, but where they exceed 5% it advises that an increase to CS2 should be considered.

The reference in the report to previous daily spot monitoring and continuous monitoring are not considered relevant because we have previously questioned the reliability of the data from this monitoring mainly due to the level of the water table in comparison to the response zone. The newly provided additional ground gas monitoring results show carbon dioxide levels exceeding the 5% trigger level on 2 more occasions (7.7% & 7.8% at WS301) These are in addition to the previously reported measured elevated levels of carbon dioxide of 8.1% and 11.5% at WS302. In most circumstances these concentrations of carbon dioxide would result in a recommendation for the site to be classified as CS2.

Hazardous gas flow rate (Q_{hg}) calculations are usually used as an assessment for each monitoring visit at each monitoring well. Gas screening values (GSV) are derived using the same calculation method but using the highest measured gas concentration and highest measured steady flow rate for the whole monitoring set to obtain the worst possible case scenario. The report has partially adopted this approach by using the highest carbon dioxide concentration of 7.8% and the highest positive gas flow of 0.2 L/hr to "give a Q_{hgs} of 0.016 l/hr". However, BS8485 recommends that negative flow rates should not be discounted unless the reason for these is fully understood and a similar positive flow can be credibly ruled out. It is considered that the source of negative and variable flow is uncertain and whatever causes the negative flow can be reversed, therefore they should not be discounted and should be included in any Gas Screening Value (GSV) calculations. If the maximum negative flow rates of -1.9L/h is used to calculate a GSV it would be calculated as $7.8 \times 1.9 / 100 = 0.1482$ L/h which significantly exceeds the trigger level of 0.07 L/h and should therefore also result in a recommendation for the site to be classified as CS2.

The suggestion that the gas generation may be due to microbial activity which is possible if air enters the ground such as when the monitoring wells were installed. However, overtime as conditions return to anaerobic, ground gas regimes will once again settle and reflect anaerobic conditions and as such carbon dioxide from microbial activity is likely to reduce. None of the monitoring data shows that the carbon dioxide levels have reduced or settled to a steady number. Consequently, it is considered that microbial activity is an unlikely source of the carbon dioxide at this site.

A previously submitted Phase 2 report for the site dated July 2019 (ref: A0697/19/B.0) provides evidence that there are shallow coal working and made ground nearby. It states *'it was concluded that due to the presence of seams of coal at shallow depths, there is potential for unrecorded shallow mine workings in the form of "bell pits" beneath the site, which could*

be prone to collapse if not properly backfilled' and 'loose wet collapsible deposits (suspected backfill material associated with bell pit mining) were encountered beneath the natural strata in TP14 (1.30-1.80m bgl), TP15 (1.00- 2.30m bgl) and WS6 (1.80-2.60m bgl).' Photographic evidence was provided in the report to support this. Trial pits TP14 & TP15 and borehole WS6 are within around 15 – 20m from the building that is the subject of this application and therefore considered to be relevant to the characterisation of the site.

The report also considers that the property is underlain by 1.5 to 1.8m of low permeability cohesive strata and that the risk of carbon dioxide ingress into the property is very low. It should be noted that no trial pit investigation was made at the location of this property because it had been constructed before the intrusive site investigation commenced. The ground strata underlying the footprint of the building and its likelihood to provide adequate gas protection measures is therefore uncertain.

BS8485 at part 6.3.3 refers to zoning different parts of a development site with different ground gas characteristics. The standard advises that sites should only be zoned where there is a clear reason for variations in gas monitoring results (e.g. different geology). This development was originally given planning consent (with conditions) as part of a larger site. It has now been agreed that the remainder of the original site is characteristic situation 2 (CS2) and that ground gas protection measures are necessary for the proposed new buildings. We have previously agreed to consider proposals for zoning of the site, but for this to be accepted it needs to be based on strong evidence that such an approach is appropriate. The information provided to date does not support considering the built property to be classified as having a ground gas characteristic situation that differs significantly from the remainder of the original larger application site.

The report recommends that the monitoring is extended for a further 2 months because there is a possibility that the carbon dioxide levels may be rising. It also offers the proposal of monitoring the indoor carbon dioxide levels within the undisturbed property of say a week which includes a period of falling air pressure.

It is considered that no further benefit would be derived from further monitoring at the existing monitoring wells. Similarly, the benefit of measuring inside the property is likely to be of limited value. It would only give a snapshot of the situation over a week and would give no guarantee that elevated carbon dioxide concentrations would not occur within the property over its future lifetime.

As discussed above, in normal circumstances, where an appropriate ground gas assessment has been carried out and either the level of carbon dioxide is found to exceed 5%, even if the gas screening value (GSV) does not exceed 0.07 L/h or where the GSV exceeds 0.07 L/h even when the carbon dioxide concentration is less than 5%, at least characteristic situation 2 (CS2) recommended. At this site, the measured carbon dioxide concentrations have exceeded 5% on multiple occasions and the calculated GSV significantly exceeds 0.07L/h (if negative flow rates are taken into account). The conflict regarding the ground gas characterisation of this site has arisen because the property was constructed without any gas

protection measures and prior to any intrusive site investigation or ground gas assessment being carried out. Subsequent ground gas monitoring exercises have found multiple occasions where carbon dioxide levels exceed 5% and the calculated GSV exceeds 0.07 L/h both indicating that the site should be characterised as CS2 and that gas protection measures for the property are necessary. Because of the situation, attempts to argue the site is CS1 are continuing to be made.

Recommendations

For the reasons detailed above we still consider that the built property needs gas protection measures consistent with Characteristic Situation 2 (CS2) and in the absence of these protection measures we are still unable to support the application.

It is understood that a further report is to be submitted by another consultant which will review all the previous report regarding the contaminated land and ground gas at the site. I would recommend that it would be appropriate to assess the further information before the application is determined.